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Rethinking market-based development approaches:

Increasing access to domestic-scale sustainable energy goods and services in sub-Saharan Africa

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Abstract

Low levels of energy access in sub-Saharan Africa and the acknowledgement of anthropogenic climate change have made sustainable energy products such as solar lanterns and efficient cookstoves a popular subject of international development programmes. At the same time, market-based approaches for distributing such 'humanitarian goods' have become increasingly prevalent. Based on ethnographic material from inside two development intermediaries, Global Village Energy Partnership (GVEP) International's 'Developing Energy Enterprises Project' (DEEP) in Kenya and Uganda and SolarAid's social enterprise 'SunnyMoney' in Malawi, this thesis argues that: 1) the complexity of applied market devices enhances inequalities between market actors; 2) the engendering of economic subjectivities within distribution chains can increase value-sharing; 3) there is space for both for-profit and non-profit 'development' intermediaries in marketisation processes, and; 4) further focus should be put on the promotion of domestic manufacturing. Stabilised market maps are used to present the activities of each organisation before turning to three frames of analysis that consider the problematisation, qualification and valuation of the energy products, the recruitment and training of supply chain 'entrepreneurs' and the specific market roles of development intermediaries, including provision of 'brokerage' services and as integral market actors. Bringing a theoretical vocabulary from economic sociology and science and technology studies into the arena of international development, the thesis reveals the extensive socio-technical configurations that constitute markets and create power asymmetries between actors. Without neglecting the vulnerabilities of the 'bottom of the pyramid' (BOP) as a 'target group,' it enhances our understanding of the shifts away from charity dependent beneficiaries' towards 'entrepreneurs,' 'customers' and investment opportunities within sub-Saharan Africa.

Declaration page

This is to certify that the work contained within has been composed by me and is entirely my own work. No part of this thesis has been submitted for any other degree or professional qualification.

Signed:

Date:

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List of abbreviations

BOP	Bottom of the (Economic) Pyramid
BRAC	Bangladesh Rural Advancement Committee
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CO_2	Carbon dioxide
COP	Conference of the Parties
DEEP	Developing Energy Enterprises Project
DFID	Department for International Development
FINCA	Foundation for International Community Assistance
GDP	Gross Domestic Product
GPS	Global Positioning System

GVEP	Global Village Energy Partnership
ICT	Information and Communication Technology
IEA	International Energy Agency
IFC	International Finance Corporation
ILO	International Labour Organisation
IMF	International Monetary Fund
KCJ	Kenya Ceramic Jiko
KEBS	Kenya Bureau of Standards
LED	Light Emitting Diode
M&E	Monitoring and Evaluation
MBS	Malawi Bureau of Standards
MDGs	Millennium Development Goals
MFI	Microfinance Institution
MLF	MicroLoan Foundation
MRA	Malawi Revenue Authority
NGO	Non-Governmental Organisation
PoA	Programme of Activities
PV	Photovoltaic
PVC	Polyvinyl chloride
REED	Rural Energy Enterprise Development
SACCO	Savings and Credit Co-operative
SHS	Solar Home System
SMEs	Small and Medium-sized Enterprises
tCO_2e	Tonne of Carbon Dioxide equivalent
UCB	Uganda Carbon Bureau
UNBS	Uganda National Bureau of Standards
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VAT	Value Added Tax
VSLA	Village Savings and Loans Association
WEDI	Women's Enterprise Development Initiative
WWF	World Wildlife Fund

1 Overview

Access to modern energy services is lacking in large parts of many developing countries and is a particularly prevalent issue in rural areas of sub-Saharan Africa. Many development intermediaries have highlighted this situation and tried to find solutions in terms of both suitable products and ways of getting them to people who could benefit from them. Although increased energy access is not one of the Millennium Development Goals, it is often noted that achieving many of those eight goals is hampered if people have no access to energy services.

In recent years, efforts in the field of 'international development' have increasingly moved towards a private sector focus in many areas, particularly with the growth of business development services and microfinance. This trend has been seen more recently in the work of development intermediaries with rural energy technologies: various organisations now run programmes that aim to stimulate local markets for small-scale clean energy products, through supporting entrepreneurs and small businesses along the supply chain.

Renewable energy and energy efficient technologies for lighting, cooking and other energy-dependent activities (hereafter called sustainable or clean energy products), have been recognised as offering viable, low-carbon energy solutions to rural populations. At the same time, there has been increasing funding for 'low carbon development' under international climate change policies, particularly carbon credit frameworks. Such opportunities for finance may have been part of the reason for increasing activities to design and distribute clean energy products.

1.1 Thesis aims and approach

The aim of this research is to gain more detailed insight into the efforts of development intermediaries that are involved in creating markets for domestic-scale clean energy products within sub-Saharan Africa. Although there is no one recognised term for the type of programme they use, they are sometimes described as 'market-driven' or 'market facilitation' approaches. The programmes are analysed within the broader context of increasing business involvement in what is traditionally termed a 'development' issue, and the thesis discusses the cross-over between development and business.

Two case study programmes have been selected for the primary research: Global Village Energy Partnership (GVEP) International's Developing Energy Enterprises

Project (DEEP) and SolarAid's pico-solar social enterprise called SunnyMoney. The research involved intensive study of these programmes in-situ in Kenya and Uganda for GVEP International and Malawi for SolarAid. The approach is ethnographic, with participant observation as the main research method, supported by semi-structured interviews and secondary data analysis. Although the case study organisations agreed to remain non-anonymous, quotations or actions have not been referenced to individual staff for confidentiality reasons. Similarly, it has not always been possible to reference data taken from interviews with other organisations as confidentiality was often requested. The real names of entrepreneurs, dealers and customers interacted with have deliberately been used where they agreed to it. This is in order to allow future research to return to the same informants and generate longitudinal data.

The core of the conceptual framework is provided by the social study of markets, particularly Çalışkan and Callon's (2010) recent work on marketisation that also draws insights from actor-network theory and science and technology studies. They conceptualise markets as 'socio-technical assemblages' and argue that aspects such as power dynamics, performativity and market devices are often overlooked and need to be considered within a marketisation research agenda. Development intermediaries such as non-governmental agencies (NGOs) are noted as viable marketising agencies. Here this theoretical vocabulary is brought into the arena of international development and used to provide a detailed analysis of market-based approaches to distributing clean energy products.

The specificity of market assemblages are inextricably linked to their location in space and time. The research for this thesis was multi-sited, taking place in multiple locations across Kenya, Uganda and Malawi. Where possible, the thesis aims to describe the particularities of the different geographical contexts and any specific influence this may have had on the findings. However, further analysis in this regard was ultimately limited by the multi-sited nature of the research, so that deeper exploration of each context and its specific influence was not possible within the boundaries of this thesis.

1.2 Thesis structure

The thesis is structured so that Chapters 2 and 3 provide an overview of the context and relevant literature. Chapter 2 describes market-based approaches within international development and their links with sub-Saharan Africa and sustainable energy, and this is followed by a review of the literature that constitutes the

conceptual framework (Chapter 3). Chapter 4 presents and discusses the research design in more detail.

The research aims to address four questions in particular.

1. What marketisation activities are the case study development intermediaries undertaking?

Chapter 5 responds to this question with detailed ethnographic insight into the two case study development intermediaries and their programmes. Market maps have been created to show how the development intermediaries sit within the markets for clean energy products that they are involved with. In this way market mapping is used as a presentation tool to demonstrate general observations of programme structure in the first instance, as well as being used as a preliminary analysis tool. The question is then more extensively answered within the responses to the next three questions, which form three 'frames' that guide the analysis.

2. How are the clean energy products stabilised, qualified, valued and priced for exchange as market goods?

For the second question the clean energy products are framed at the centre of the analysis and their stabilisation as 'humanitarian goods' is described in Chapter 6. This is followed by an examination of the processes of qualification (in Callon's sense of the term), valuation and pricing that occur through the application of cognitive and technical tools by various market actors. Particular focus is put on the role of market devices that are used to add value to products, such as warranties and carbon credit methodologies, and the power dynamics that emerge through market actors' differing levels of access to them.

3. What processes render people into 'local entrepreneurs' and thus economic actors?

The focus is then shifted in Chapter 7 to the 'local entrepreneurs' as the next frame of reference. Local entrepreneurs and dealers are drawn into the development intermediaries' marketisation programmes as participants in the domestic supply chains of clean energy products. Their recruitment, training and evaluation are specifically discussed, with the availability and utility of skills, social networks and technical tools analysed at each stage. Consideration is also given to beneficial and negative aspects of the 'economisation' of these local actors by external forces.

4. What factors affect the agency and actions of the development intermediaries as marketisation actors?

For the final question, the framing is moved to the development intermediaries as organisations that operate within the international development industry. The different demands put on them and their responses to being both development actors and marketisation actors are considered in Chapter 8, with some comparative analysis of the two case study organisations. The wider impacts of a shift towards market-based approaches within international development are also discussed and more practical lessons for policy and programme design drawn out.

Finally, Chapter 9 pulls together the main conclusions of this research, highlights some of its limitations and proposes areas of further investigation.

1.3 Research findings

Through the approach outlined above, the research highlights the dynamic nature of markets as socio-technical assemblages. Sustainable energy products are particularly interesting to study because of their multi-faceted valuations: as 'humanitarian goods'; as 'low carbon' technologies that generate carbon credits; as income-generation opportunities; as affordable energy solutions. This research finds, however, that some of the 'market devices' being designed and applied by marketisation actors to attach particular values to energy products rely on complex configurations of technical and material components that can be unavailable or inaccessible to other market participants. The financial and technical agency of international actors to access carbon finance devices, for example, turns them into 'macro-actors' and creates power asymmetries with local artisan manufacturers. Similarly, simple items (such as receipts) that are required for warranties to function are not always available in informal, rural settings. More locally appropriate after-sales service systems may therefore be required to protect a potentially vulnerable target group.

The conceptual framework used for this research stresses that markets are not cold, stable entities but are configured out of a collective performance that follows sets of tacit rules and procedures. Like many market-based development approaches, both development intermediaries recruit and train local 'entrepreneurs' to make and/or distribute energy products. Some critics have found such engendering of 'economic' subjectivities problematic, but here it is argued that it can in fact increase the value gained locally from supply chains for humanitarian goods. Furthermore, their

'economisation' does not occur from a baseline of zero market involvement or understanding, and although existing networks, skills and material resources are inevitably drawn on, there appears to be no forced requirement to do so in these case studies. Difficulties inevitably arise, however, such as if formal indebtedness is advocated as the only solution for enterprise growth or if trust-based relationships of entrepreneurs are jeopardised through subsequent product failures. This further underlines the need for appropriate after-sales service systems.

Overall, these case studies demonstrate that market-based approaches offer space to both for-profit and non-profit organisations. In particular, the provision of market 'brokerage' services under GVEP International's Developing Energy Enterprises Project enhances the agency of local market actors, perhaps not only in economic terms. The relatively recent concept of 'social enterprise' offers a promising for-profit model that could provide enhanced impact checks, if regulatory frameworks are developed further and take into account the unavoidable positive bias of monitoring activities.

This thesis also argues that the shift within development discourses from charity-dependent 'beneficiaries' to 'entrepreneurs' and 'customers,' alongside increased focus on investment opportunities within sub-Saharan Africa, might partially address 'post-development' arguments that development activities inherently reinforce negative conceptualisations of developing countries. The caveat is that power asymmetries between international and local actors need be kept in check and greater value-sharing facilitated. For this reason, continued promotion of domestic manufacturing capacity is necessary. Continuing to address consumer finance barriers in ways that adhere to some of the lessons learnt here are also fundamental in ensuring that these humanitarian goods are really accessible to those at the 'bottom of the economic pyramid'.

1.4 Research contribution

Literature review shows that there has been limited in-depth academic research into market-based approaches within international development, and certainly little that applies the theoretical vocabulary promoted by Çalışkan and Callon (2010) in their call for more research into marketisation processes. In the context of sustainable

energy technologies, notable exceptions include work by Akrich (1992) and Cross (2013) on solar lighting products and Dolan's (2012) analysis of BOP entrepreneurs[1].

This thesis builds on the small body of literature to consider a larger array of market-based approaches in extended depth and through a socio-technical marketisation lens, including support for both local artisanal production and imported goods distribution, and a greater range of technologies (clean cookstoves and biomass briquettes are the focus in addition to solar products.) It therefore contributes to the existing body of literature in economic sociology and the social study of markets, extending existing work and bringing a focus on humanitarian goods and their distribution to this discipline. It also firmly situates the conceptual approach within a landscape of international development theory and practice, offering a new combination that deserves further exploration.

The ethnographic case-based methodology used here generates 'thick description' (Geertz, 1973) of how the development approaches work in practice. It also gives the opportunity to update older descriptions from 'inside' NGOs such as Crewe and Harrison's (1998) detailed account from the 1980s and 1990s, since when the nature of international development organisations appears to have changed considerably. Although this thesis alone may offer limited opportunity for broader generalisation or development of new theories around development intermediaries and sustainable energy programmes, it at least increases the collective body of evidence for 'naturalistic generalisation' (Stake, 2000) in future.

In addition to its contribution to social science, this research is also intended to have a practical value for energy and development practitioners and policymakers. Again, this is reflected in the methodology. Lewis and Mosse (2006) emphasize that:

> […] ethnographic research can provide policymakers and aid managers with valuable reflective insights into the operations and effectiveness of international development as a complex set of local, national, and cross-cultural social interactions.

Although policy or strategy solutions have not been sought directly in this thesis, the findings are believed to be highly relevant and are being disseminated through knowledge transfer activities.

[1] The research material includes the 'Solar Sister' initiative in Uganda

2 Background and literature review: development, markets and energy

This chapter introduces some of the history of international development, providing an overall context before identifying how market-based approaches emerged within the field. It then focuses in on sub-Saharan Africa and sustainable energy technologies for rural energy access. At each stage, key academic literature is discussed in order to provide a critical insight and present the current knowledge base. Areas of contestation and limited analysis that may benefit from further research are also identified. The discussion concludes that additional in-depth primary research into market-building development approaches, including those focused on providing clean domestic lighting and cooking products for energy access, could make a valuable contribution.

2.1 Historical overview of international development

Use of the term 'development' in an international development context is widely considered to have become commonplace following US President Harry Truman's 1949 Inaugural Address. 'Point Four' started with the following oft-quoted statement:

> We must embark on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas. (cited in Esteva (1992) p.6)

Although the term was already familiar in some areas, this particularly prominent public reference to 'underdeveloped' areas is said to have firmly established the dichotomy between advanced 'developed' countries and 'underdeveloped' ones afflicted by associated conditions of poverty, the latter representing a homogenous group and requiring the former's support to escape their condition (Esteva, 1992). This new terminology supported a paradigmatic shift away from an earlier world-view of 'colonisers' and 'colonised' (Rist, 2008), coinciding with the achievement of independence of many colonies from the 1940s onwards.

The varied tenets of post-Truman development theory are grounded in a much older history of thought. Theories around how societies progress in a certain direction of growth or according to certain changes in political economy can be traced back to various earlier theorists, including Adam Smith, Karl Marx and Max Weber (Payne and Phillips, 2010) and the Saint-Simonians, Friedrich List and John

Stuart Mill (Cowen and Shenton, 1995), for example. In more recent times the term 'development' has become a highly contested concept used to describe both a process, intentionally directed or otherwise, and an undefined goal. There have unsurprisingly, been diverse proposals of how to achieve it.

Overwhelmingly in the history of the term and despite frequent criticism, economic growth has been a focal point. For example, as early as 1969 Seers issued a communication entitled 'The Meaning of Development' that stated:

> […] it looks as if economic growth may not merely fail to solve social and political difficulties; certain types of growth can actually cause them. (Seers (1969) p.2)

Despite such critics, the economic focus has remained and some of the key debates over time have been around the necessary or desirable levels of state intervention in national industries and services in order to promote economic growth.

In the late 1980s, a neoliberal turn in western economic theory led to a neoliberal agenda being adopted by the primary multilateral development organisations, particularly the International Monetary Fund (IMF) and the World Bank. Neoliberalism became the justification of structural adjustment policies and subsequent 'good governance' initiatives, with loans being provided to developing country governments only on the condition of national macro-economic reforms such as privatisation and deregulation (Rist, 2008). Such approaches have since received significant criticism, not least because of their neglect to consider unique individual country contexts. A lack of sustained increase in economic growth rates and, in the case of a number of Latin American countries, the total collapse of their economies, were seen as the results of failed structural adjustment policies. Reduced living standards were also associated with the rushed privatisation of state services. At the same time the successful economic growth and increased welfare standards of Japan and other newly industrialising East Asian countries from the 1960s to late 1990s appeared to justify at lease some level of state involvement in industrialisation activities (Payne and Phillips, 2010).

Different approaches to development were still being sought, and gradually some of this work gathered momentum to present a range of 'human development' approaches. A 'basic needs' focus promoted by the United Nations' (UN) International Labour Organisation (ILO) proposed a shift in development goals away from aggregate economic growth towards the delivery of essential services, employment opportunities and participation in political decision-making for all (ILO, 1976). A key proponent was Amartya Sen, who took the idea further and

promoted both a definition and means of development as 'promoting the freedom of individual agency'. Sen (1999) also highlighted that problems of deprivation, destitution and oppression can equally be found in rich countries as well as poor.

Gradually aspects of these human development ideas moved to the mainstream development machinery and in 1990 the UN Development Programme (UNDP), originally founded in 1966 (UNDP, 2013d), produced the first Human Development Report: "with the goal of putting people at the center of development, going beyond income to assess people's long-term well-being" (UNDP, 2013a). It ultimately paved the way for the Millennium Summit, the signing of the Millennium Declaration and the indirectly associated establishment of the Millennium Development Goals (MDGs, Figure 1) in 2000 (Saith, 2006).

Figure 1: The eight Millennium Development Goals (UNDP, 2013c)

The MDGs again aimed to shift development focus to the achievement of broader living standards and basic human rights, and thus finally reduce single-minded focus on economic growth. The MDGs still receive significant criticism, however, such as: a failure to address the politically problematic area of inequality between rich and poor; a focus on poverty in developing countries and lack of acknowledgement of its existence in developed nations, and; continued failure to appreciate often vastly differing country contexts (Saith, 2006).

The brief overview above focuses on international development theory and related institutions, particularly the World Bank, IMF and UN agencies, but Charnovitz (1997) argues that a wide variety of non-governmental organisations (NGOs) have

influenced international governance for at least two hundred years. Lewis (2005) highlights a significant growth in interest in the role of development NGOs from the late 1980s onwards, but finds very little acknowledgement of their work in writings prior to this. He attributes the surge in interest partly to the neoliberal meta-narrative of the time that promoted a move away from state intervention and, in tandem, recognised the ability of NGOs to deliver services outside of the state (Lal, 2002), as well as a continuing search by individuals for alternative development agendas that would focus more on localised interests of the poor and grass-roots initiatives than mainstream development was currently doing. As Lewis (2013) describes:

> There was a period of discovery and celebration of NGOs among international donors as they became seen as a possible 'magic bullet' that would bring new solutions to long-standing development challenges that had up to that point been characterized by inefficient government-to-government aid programmes and frequently ineffective and unsustainable development projects. (ibid., p.65)

The term 'NGO' has a broad range of applications and has been defined in numerous ways, leading to a diversity of interpretations. For example, it can sometimes be restricted to non-profit organisations only and therefore exclude the growing number of for-profit organisations emerging in the development sector. This thesis therefore uses the term 'development intermediaries' to signify organisations that have a stated intention of directly participating in international development efforts through delivery of 'development-related services', sometimes, but not always, on the basis of donor funding.

2.2 Emergence of new market-based development approaches

The neoliberal policies of the 1980s and 1990s that forced developing countries to 'open up to the market' through hurried structural adjustment programmes are now seen to have failed to contribute to, and in fact considerably damaged, the international development agenda. However, some less aggressive, more nuanced market-based initiatives have also emerged, particularly through the work of NGOs and other development intermediaries. Although these approaches still work on the premise that stimulating domestic economic activity is conducive to development, they show greater sensitivity to the specific needs of both businesses and individuals and take on some of the 'basic needs' and 'pro-poor' human development ideas discussed above (King and McGrath, 1999). There is a huge

range of activities that could be considered here, so the discussion below has been shaped into three loosely defined categories of market-based development initiatives.

Positioning within global markets

A key criticism of early neoliberalism is that in combination with rapid globalisation it left developing countries in very weak positions within international markets, particularly for agricultural produce which often constitute primary exports. Initiatives such as "Making Markets Work for the Poor", supported by national development agencies including the UK's Department for International Development, are based on the principle that the poor depend on market systems for their livelihoods and that these market systems can be changed in pro-poor ways (DFID, 2008), for example by promoting better institutional arrangements at various levels from local government to international agreement. It could also be through direct work with market actors, such as supporting a lead firm (often, but by no means exclusively, in a western country) to identify and implement pro-poor policies within their supply chain (Humphrey and Navas-Aleman, 2010). Tools and frameworks such as the UN's Guiding Principles on business and human rights, the UN Global Compact, and ethical labels such as Fair Trade have been developed to promote such activities (Ruggie, 2013). Supporting social and economic development in such ways is now often wrapped up in companies' corporate social responsibility (CSR) agendas. Another value chain approach is to work directly with those within a chain to help them add more value to their products (Johnson, 2009). This last method can also be considered within the 'enterprise development' category discussed later.

International and domestic businesses serving 'BOP' markets

At the same time that development intermediaries are focussing on producers situated at the raw material end of global value chains, there have also been calls for private sector actors to see the poor in developing countries as potential consumers of manufactured goods and therefore to design products that specifically meet their needs. This partly stems from Prahalad's (2010) efforts to promote the 'bottom of the pyramid' (BOP) as an active market opportunity. He describes the BOP as the around four billion people who live on less than US$2 per day. The term is thought to have first been used by Franklin Roosevelt in a 1932 radio address during the Great Depression in which he urged people to put their faith back in the primary

units of economic power: the men at the bottom of the economic pyramid (Errington et al., 2012).

Prahalad gives examples such as the large mobile phone uptake in 'BOP markets' as evidence that the poor are willing and able to pay for products that meet their lifestyle needs and desires. Figure 2 shows that more than half of the population of sub-Saharan Africa now own a mobile phone and three quarters either own or have access to one. Furthermore, Figure 3 shows that ownership and access rates are still high even when only the poorest are considered: a third of the poorest 20% of Ugandans own a mobile phone, for example.

Figure 2: Access to a mobile phone in sub-Saharan Africa (Godoy et al., 2012)

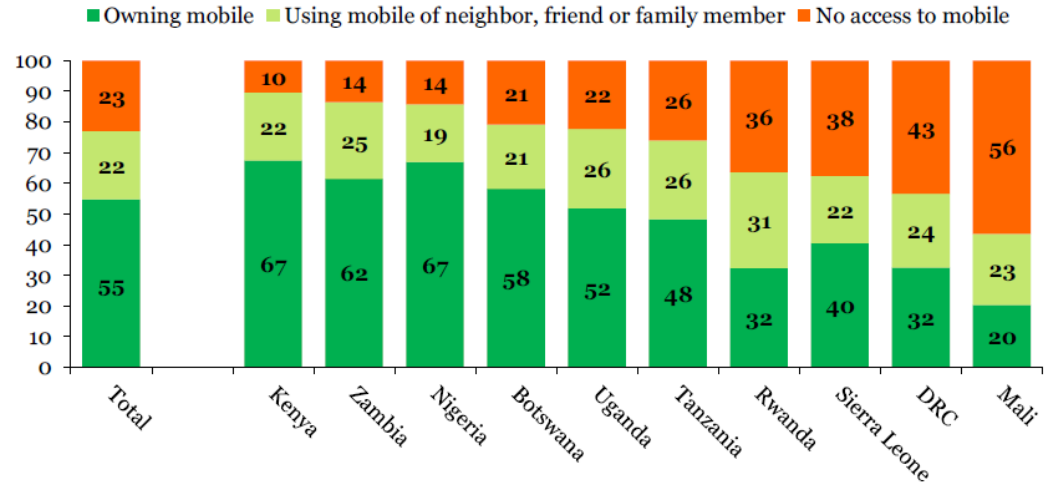
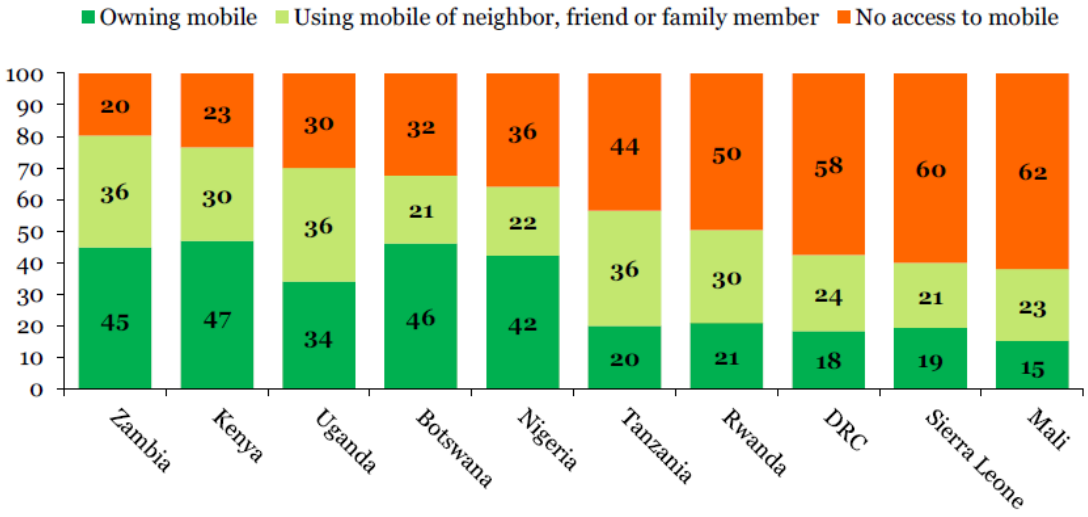


Figure 3: Access to a mobile phone among the poorest 20% of population of each country (Godoy et al., 2012)



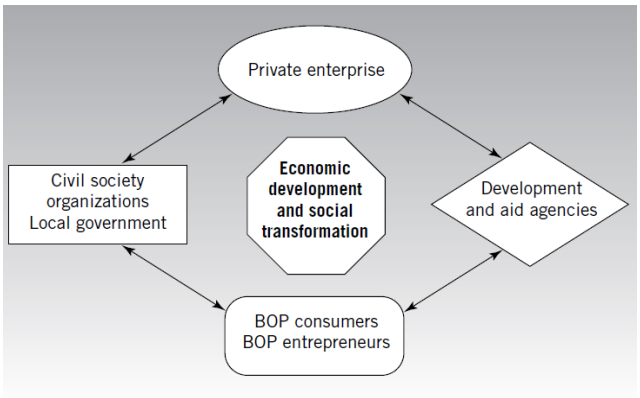
Woller (2002) highlights the impact that regarding the poor as valid consumers of financial services has had on the microfinance sector. Microfinance was one of the

first specifically BOP-targeted business models and "shattered stereotypes of the very poor as not bankable" (ibid., p.305). There are also many examples of the impacts microfinance can have on individuals' abilities to develop productive enterprises, again linking with enterprise development initiatives discussed below.

Microfinance providers have received various criticisms, however. For example, the need to decide between profitability and providing for the poorest of the poor, as opposed to just the relatively poor, has been recognised as limiting the impact that the service can have on poverty reduction (Cull et al., 2007, Woller, 2002). Smith (2009) discusses the example of the pharmaceuticals industry and the similar issue of limited profit opportunities, leading to the reality that: "[…] there is simply very little incentive for the private sector to develop vaccines for HIV, malaria or tuberculosis" (ibid., p.84). Reviews of multinational companies' policies show that many do not incorporate a poverty alleviation role in their corporate sustainability strategies, or where they do they are limited compared to what international development advocates might hope for (Kolk and van Tulder, 2006).

Innovative public-private funding partnerships offer one solution to bridge the incentives gap (Smith, 2009, pp.86-88). Prahalad (2010) also proposes a framework of interconnected players that can establish the necessary market structure to design and deliver BOP-targeted products. Figure 4 shows how the work of private enterprise can be combined with that of development agencies, civil society organisations, governments and local BOP entrepreneurs in order to build effective BOP markets.

Figure 4: Interconnectedness of players in BOP markets (Prahalad, 2010)



International companies such as Unilever, Bic, Danone (Dolan et al., 2012), Hewlett-Packard (Schwittay, 2011) and Coca-Cola (Foster, 2008) have used BOP approaches to sell their products in developing countries, directly or indirectly employing networks of 'BOP entrepreneurs' to provide the local distribution systems and

engaging or partnering with NGOs and local governments to help establish their activities. In some cases, framing their products as 'humanitarian goods' helps these multinational companies to create the necessary buy-in to take their market-building approaches forward (Cross and Street, 2009).

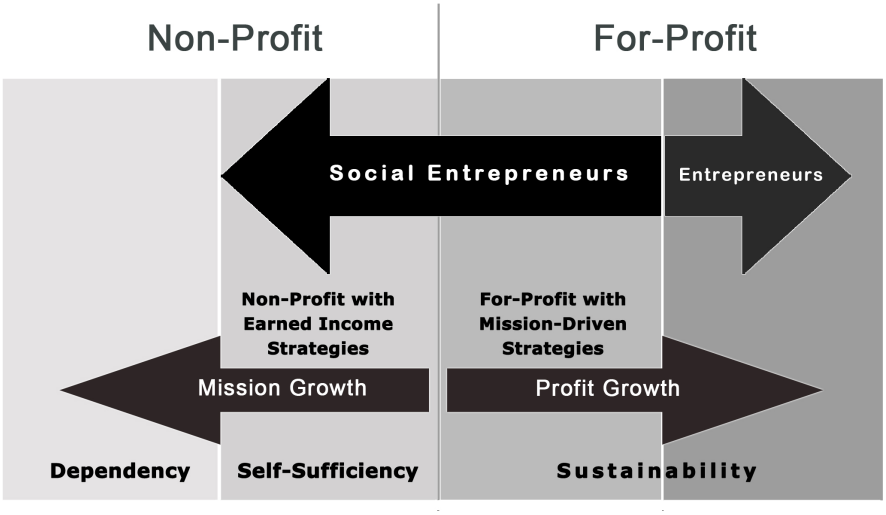
Other private sector actors attempting to deliver humanitarian goods through a business approach are social enterprises. These are hybrid businesses that are more specifically oriented towards achieving social and/or environmental benefits than typical multinational corporations might be. They still have an aim of financial self-sufficiency rather than long-term reliance on donors, but profitability is not a defining criteria (Blowfield, 2012). Dr Mohammad Yunus, the founder in 1976 of the first microfinance institution, Grameen Bank in Bangladesh, is one of the most well-known proponents of the social enterprise model (Rashid and Rahman, 2009).

The model is by no means restricted to developing country contexts and it is being increasingly widely used globally. However, there is still no specific definition for a 'social enterprise' and only a handful of legal structures are available and they are neither mandatory nor have wide geographical reach (Westaway, 2011).[2] Some argue that this results in a lack of coherent analysis of social entrepreneurship (Abu-Saifan, 2012), limited specific policies to promote 'real' social enterprises and the opportunity for more 'mainstream' businesses to appropriate and benefit from incorporating a social enterprise identity into their marketing (Jones, 2012).

Through analysis of existing social enterprise models, Abu-Saifan (2012) proposes the boundaries of social entrepreneurship illustrated in Figure 5, whereby non-profit social enterprises have some form of earned income strategy and for-profit social enterprises have socially beneficial aims incorporated into their business mission. Either side of this, beyond the social entrepreneurship definition, are charity-dependent non-profit organisations and mainstream for-profit businesses.

[2] A new hybrid legal form has been introduced in the UK called a Community Interest Company (CIC). In the US there are various options in different states, such as a Low Profit Limited Liability Company (L3C), a Benefit Corporation (B-Corps), or a Flexible-Purpose Corporation (Westaway, 2011). All of these structures are optional and most African countries are yet to have something equivalent.

Figure 5: The entrepreneurship spectrum illustrating the boundaries of social entrepreneurship (Abu-Saifan, 2012)



In the field of international development, some suggest promotion of social enterprises that "are based on market principles but dedicated to improving the lives of the poor" (Rashid and Rahman (2009) p.1057) as a more sustainable option than engaging mainstream businesses such as multinational corporations in BOP markets.

Enterprise development and entrepreneurship

Encapsulating aspects of both of the above categories, the third type of market-based development approach focuses on supporting the growth of private enterprises within developing countries. Often referred to as 'private sector development' initiatives, they involve helping existing businesses to grow and new businesses to start up through provision of a range of support services. Entrepreneurship has been central to various reincarnations of economic development theory, and private sector development approaches try to promote, identify and support entrepreneurial activities. In many cases development intermediaries focus on helping low income entrepreneurs specifically, including those who might be defined as 'BOP entrepreneurs' within Prahalad's (2010) proposed market-building system.

The international development sector has been interested for at least 35 years in supporting the growth of small enterprises in particular. A Committee of Donor Agencies for Small Enterprise Development was formed in 1978, although at the time it was still the interest of a limited few (Steel, 2009). Steel provides a thorough history, describing how the focus in the 1990s was on non-financial support such as

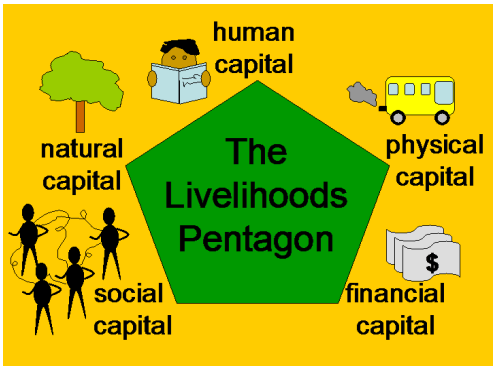
provision of training and technical assistance. Around 1997 this became termed as 'business development services,' distinguishing it from newly-emerging financial services provided through microfinance.

Enterprise development draws on ideas such as the ILO's foregrounding of employment opportunities as central to a 'basic needs' development approach. It equally relates to the subsequent emergence of 'sustainable livelihoods', a niche development approach that emerged in the early 1990s (Scoones, 2009). Helmore and Singh (2001) describe how:

> A key feature of the sustainable livelihoods approach is the recognition that the root of all human development and economic growth is livelihoods – not just jobs per se, but the wide, infinitely diverse range of activities people engage in to make a living. (Ibid., p.3-4)

The sustainable livelihoods approach recognises that people have access to assets, or 'capital', which act as resources that can enhance their livelihoods. Capital is commonly summarised into distinct types, including: natural, financial, human, social and physical capital, with various others sometimes added (Scoones, 2009). These are shown in Figure 6.

Figure 6: The five types of capital in the Sustainable Livelihoods Approach (Heemskerk, 2005)



Enterprise development approaches aim to help small businesses draw on existing assets or gain further capital to help them grow. For example, existing social capital in the form of social relationships can be used to increase product sales, new human capital can be acquired in the form of knowledge via training programmes, or financial capital can be increased through microfinance loans. Although the sustainable livelihoods approach is now less commonly referenced, use of the sociological term 'social capital' is still widely used. The term and its critique are discussed further in the following chapter.

Enterprise development approaches also link with an increasing recognition of and interest in what has been conceptualised as the 'informal sector' or more recently as the 'informal economy'. Although the concept was popularised by the ILO, its origins are often attributed to anthropologist Keith Hart's (2007, 1970, 1973) writings on the small-scale informal service-sector enterprises established by the Frafra in Ghana (Palmer, 2004). Pellissery (2013) asserts that "the informal economy is the sole source of livelihood for the vast majority of households in the global South" (ibid., p.81) and cites the initial definition of economic informality from a 1972 ILO paper as:

> […] characterized by: (i) ease of entry; (ii) reliance on indigenous resources; (iii) family ownership of resources; (iv) small scale of operations; (v) labour intensive and adapted technology; (vi) skill acquired outside the formal school system; and (vii) unregulated and competitive markets. (Cited by Pellisery (2013) p.82)

More recently the ILO has redefined the informal economy as "all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements" (ILO (2009) p.iii). Private sector development initiatives tend to be aimed at either improving service availability for informal economy workers and/or helping them to move from the 'informal' to the 'formal' economy (Hope, 2008).

The Peruvian economist Hernando de Soto (2001) finds that formal economic frameworks are often highly inaccessible for the poor, particularly in developing countries that may have bureaucratic and antiquated legal frameworks. This restricts formal registration of assets such as businesses and property and leads to such resources being 'dead capital', creating an 'undercapitalized sector' where many people live and work outside of the law and rely instead on extralegal social contracts. De Soto highlights the innovation and determination of those that manage to do well despite such barriers:

> The words 'international poverty' too easily bring to mind images of destitute beggars sleeping on the kerbsides of Calcutta and hungry African children starving on the sand […] it draws attention away from the arduous achievements of those small entrepreneurs who have triumphed over every imaginable obstacle to create the greater part of the wealth of their society. […] I resent the characterization of such heroic entrepreneurs as contributors to the problem of global poverty. They are not the problem. They are the solution. (ibid., p.34)

There are a wide variety of ways that development intermediaries engage in enterprise development, from bottom-up approaches that target specific business

types or sectors to top-down attempts to change conditions more broadly to facilitate private sector growth. Altenburg and von Drachenfels (2006) describe a 'new minimalist paradigm' in private sector development literature that argues against interventionist programmes to support individual sectors or enterprises, instead favouring general efforts that favour all types of businesses, such as strengthening property rights frameworks and regulatory streamlining. However, Altenburg and von Drachenfels find that such approaches are overly optimistic and overlook some of the benefits and successes of more targeted market-based programmes.

Sometimes enterprise development initiatives are carried out in tandem with approaches from one of the first two categories discussed above, for example when local entrepreneurs are supported through business development services with the overall intention of helping them to deliver 'humanitarian goods' to poor consumers. A seemingly successful example is cited by Smith (2009): International Development Enterprises, an international NGO based in India, ran a long-term programme to introduce treadle pump technology to Bangladesh. Having developed a cheap foot-based pump system and after engaging with farmers to establish that it was a desirable product, the NGO initiated a start-up phase that included technology demonstration, supporting partner producers, establishing quality control and making low profit-margin sales. After establishing the primary market momentum, International Development Enterprises withdrew from direct sales to become a 'market facilitator', providing technical support to new private producers, and finally into a wider promotion role where they provide training and other facilitation activities in support of treadle pumps. Smith (p.78) particularly notes how the NGO sought to make its own role in the market redundant over time.

2.3 Detailed analysis of market-based development approaches

The focus of this thesis is on 'market-based development approaches', taken to be the array of initiatives undertaken by NGOs, social enterprises and businesses to provide welfare solutions through building or facilitating markets. It does not include the broader, more aggressively applied pro-market mechanisms described earlier as part of the larger-scale neoliberal development thinking of the 1980s and 1990s, such as structural adjustment.

Some of the evaluative work examining market-based development programmes has been described above. Here a more in-depth examination of various case studies

is provided, many of which involve a combination of both enterprise development and delivering products associated with social benefits. Dolan (2012) highlights tensions within programmes which simultaneously constitute "the 'poor' as development beneficiaries, 'modern' consumers and capitalist entrepreneurs" (ibid., p.3). The discussion is divided into the last two categories of consumers and entrepreneurs and examines how development intermediaries apply these concepts.

The poor as entrepreneurs

A significant critic of enterprise development approaches is Julia Elyachar (2005). Her book *Markets of Dispossession* presents in-depth ethnographic analysis of the creation of the 'micro-entrepreneur' category in Cairo in the 1990s following a suite of funding packages from international organisations in the wake of structural adjustment. The focus of the ethnography is the neighbourhood of el-Hirafiyeen, a place specially built to house both relocated traditional master craftsmen and new 'micro-entrepreneurs'. The latter is a category created by NGO programmes out of disadvantaged youth who were given rapid technical and business training along with development loans in order to start their own micro-enterprises. She found that it was suddenly not enough to be a traditional craftsman, instead you had to be a 'micro-entrepreneur'. Where tradition, trust and social ties had previously been valued outright, the youth were trained to value these in economic terms: short-term, individual gain was being promoted by the NGOs, in direct contrast to the longer-term 'relational value' that the traditional master craftsmen of Cairo attach to deepening workshop-based relationships. Overall, Elyachar describes this process as dispossession, whereby the microenterprise initiatives appropriate the relationships, networks and forms of co-operation which people at the BOP rely on to survive and arbitrarily incorporate them into their market development projects.

Cross and Street (2009) analyse Unilever's Project Shakti that established a network of local saleswomen to sell their Lifebuoy soap in rural India. Between 2000 to 2004, enough Shakti Ammalu (Ammalu meaning 'Mothers') had been recruited to sell the soap in 50,000 villages across 12 states, reaching 70 million consumers. Again it is suggested that the women were being dispossessed of their relations of kinship, community and indebtedness in order to sell products. "When the Shakti Amma sells soap to village women in rural Andhra Pradesh her existing network is appropriated by a project of market development, and the work of building and maintaining these relationships is the creative labour that Hindustan Unilever extracts to add value to the Lifebuoy soap brand." (ibid., p.9) Ultimately, the multinational company is utilising poor people's networks to gain profit.

Simone (2004) proposes conceptualising 'people as infrastructure', based on analysis of inner city economic collaboration between residents in Johannesburg. Regular but flexible social meetings between people act as a type of infrastructure akin to more physical city infrastructure such as highways, pipes and cables. Elyachar (2012) suggests that recognising people's connectivity as an economic resource could help promote them to receive the deserved recompense for their utilisation.

Other researchers present case studies that highlight more positive impacts of market-based programmes and suggest that their use of social ties is already rewarded to some extent, both economically and through non-economic personal benefits. In their analysis of Unilver's Project Shakti, Cross and Street note its similarity to the 'Avon ladies' model: a way of selling female-oriented products through informal networks of women that originated in California in 1886. The original Avon company has since proliferated worldwide and Dolan and Scott (2009) provide a detailed account of the Avon system in South Africa. Again the use of social networks is key: women are recruited to become sellers by other women already within the scheme. In their study Dolan and Scott found that "over 80 per cent of women were introduced to Avon by friends, relatives and co-workers" (ibid., p.208). A similar proportion also said that they then used their existing social ties for gaining sales. Sellers ('representatives') receive about 20% commission on sales, whilst the women that recruit them ('group sales leaders') also receive a small commission on sales made by the representatives they recruit, in order to incentivise them to recruit carefully and provide continuous motivation to their recruits.

In addition to these economic benefits the researchers identified a strong narrative of personal empowerment and confidence building through the Avon women's participation in direct selling activities. A study in South Africa suggested that confidence is a particular barrier to women taking up entrepreneurial opportunities, with over 50% of South African women deeming themselves incapable of doing so (Maas and Herrington, 2006). The reports the Avon women gave of enhanced personal well-being through increased confidence, self-esteem and autonomy led Dolan and Scott (2009) to conclude that:

> While the company employs a range of strategies to motivate women as capitalist entrepreneurs, it has also opened up new possibilities for women to become agents of personal and social change; not a small accomplishment in a context where gender inequality, exclusion and disempowerment often frame a woman's life. (ibid., p.215)

As well as the clear benefits, the South African Avon women were still found to experience some down-sides to using their social ties for economic purposes, often reporting feeling "squeezed between buyers and the company" (ibid., p.210). Over two-thirds of the traders interviewed stated that payment often caused tensions, particularly when trying to collect money from close friends and family. Low-income vendors are unlikely to have excess capital to use as contingency for paying the parent company in such situations. It highlights the pressure exerted on informal sales representatives caused by the contrasting relationships that they are at the centre of: a formalised contract between themselves and Avon with tightly controlled credit availability on one side, and an informal social tie based on trust and social expectations on the other side.

In a similar study Dolan et al. (2012) studied the CARE Bangladesh Rural Sales Program, for which the international NGO 'CARE' partners with various multinational and domestic companies to provide a business opportunity for women ("*aparajitas*") to sell those companies' products door-to-door. It now represents a network of more than 2,400 women across 58 hubs in Bangladesh selling a wide variety of goods, including toiletries, agricultural products and medicine, and represents an approach more specifically designed with 'development' in mind than the Avon model might be described as. The program targets the very poor and marginalised, such as widows or those with incapacitated husbands. In many cases they had already been carrying out informal sales or services to provide extra income, so the sales channels were often established to some extent – illustrating that such initiatives are not always appropriating purely non-economic social ties. To ease payment processes the women are allowed to make their own arrangements for exchange where found desirable, including bartering or swapping. CARE provides business training, identification cards and items such as carry bags for the women to transport their goods in. Again most of the *aparajitas* interviewed by Dolan et al. (2012) described feelings of increased confidence and respect from their participation 'in the market economy', as well as tangible increases in income used to improve their families' standard of living.

As well as the dispossession of social ties and practices, Elyachar (2005) criticises how 'micro-entrepreneurs' are encouraged into debt through taking up loans. Microfinance is an approach within enterprise development that grew rapidly after the first micro-credit programmes emerged in the 1970s. It has often had a gendered dimension, focusing on women specifically in line with feminist development views, and it has widely received both praise and criticism. There has also been recognition

that microfinance is not enough on its own to build successful businesses and that challenges faced by entrepreneurs can be much broader than simply financial ones (Chikweche and Murisa, 2013).

Ismail (2006), however, argues that the new development discourse around microcredit and entrepreneurship reconstructs the poor as entrepreneurs simply needing injections of capital in order to tap into their social capital to lift themselves out of poverty. She suggests that macro-level arguments of inequalities in the world economy have been abandoned in favour of the micro-level engenderment of entrepreneurial subjects, transferring the responsibility for getting out of poverty on to the poor themselves. Ismail highlights that even the success of microcredit programmes is often measured on the basis of whether it has led to larger loans being taken: "In impact-tracking studies, success is signalled by the borrower's ability to repay the loan and in his/her engagement in getting a larger loan. In other words, greater indebtedness and an inability to break out of the debt cycle is interpreted as a measure of success by the lenders." (ibid., p.92)

Clearly in some cases the indebtedness of the poor will be unproductive. Moxham (2006) presents an example of a relatively unsuccessful project to provide micro-credit loans to widows to establish kiosks in the Bobonaro district of Timor-Leste, under a World Bank initiative to build a market economy in the aftermath of gaining independence. In 70% of cases, the widows did not make enough money to pay back the original loan. Cited failings included overcrowded and unprofitable trading niches. In that case repayment of the loans was not enforced, but as with Elyachar's (2005) work it shows that to be successful, market-based development initiatives require much more than simply training in a particular business model and access to capital. Several years after el-Hirafiyeen had been established to house new micro-enterprises, many of its workshops could be found no longer in use, the youth designated as entrepreneurs having left to find other sources of income.

Profit-making microfinance organisations must inevitably impose relatively high interest rates in order to cover the expense of administering numerous disparate small loans. Although these rates still tend to be significantly lower than the only alternative of informal money lenders, microfinance is still claimed to have led to suicides among borrowers unable to repay loans in India (Ly and Mason, 2012). In more comprehensive market-based initiatives there are ways in which the indebtedness of entrepreneurs can be kept to a minimum, helping to avoid such extreme results. Avon, for example, are careful to enforce that accounts are cleared before a new order can be placed (Dolan and Scott, 2009). In the CARE Bangladeshi

Rural Sales Program, women in fact cited use of their income from making sales to pay off other debts, and even loaning money to others in some cases (Dolan et al., 2012). Syed (2009) assimilates the provision of access to credit to Sen's (1999) vision of development as freedom through enhancing the agency of people, particularly women, to pursue their own goals.

There have been various analyses of the impact of business development services offered without any form of micro-credit or specific agenda to sell products. The programmes can offer business methods training, technical assistance or a combination of both. Mano et al (2012), for example, analysed a managerial training programme for micro and small metalwork enterprises in Ghana by assessing business practice and performance of the participants before and after. The results showed that the programme helped increase business survival rates in general but had mixed impacts on performance otherwise, although there were certainly some improvements. Other studies have also had similar findings and performance levels are acknowledged to be widely affected by other factors, including diverse education levels of targeted entrepreneurs, limited acceptance of benefits of improving business practices, and changing external conditions impacting low-resilience enterprises (McKenzie and Woodruff, 2013).

The poor as consumers

Blowfield (2012) describes how: "business is being depicted as a consciously engaged agent of development, and has become a preferred actor when it comes to lifting people from poverty" (ibid., p.415). Yet at the same time, he highlights, businesses are by no means compelled to act as development agents, their engagement in poverty alleviation is likely to be propelled by economic self-interest and there is not yet a robust accountability system for development outcomes of business ventures, positive or negative. Blowfield therefore warns that there needs to be wider debate about the potential drawbacks or dangers of the private sector serving the poor with tailor-made products. Some of the analysis in this area focuses on specifically what products are being promoted.

Taking the products that are sold under the CARE Bangladesh Rural Sales Program (Dolan et al., 2012), items such as medicines and nutritional supplements can clearly be argued to improve the living standards of those purchasing them, yet other products such as a skin-lightening cream manufactured by Unilever are much harder to reconcile with 'development' aims. Elyachar (2005) highlights the case of the Bangladeshi micro-credit organisation Grameen Bank signing a contract with

the multinational agricultural firm Monsanto. Despite much controversy over its genetically modified crops, the social networks of the poor that Grameen Bank had already harnessed were used to sell Monsanto's agricultural inputs. Dolan (2012) equally notes the contradictions inherent in initiatives that promote "single-serve sachets of soap and shampoo in a context of global climate change" (ibid., p.3). Nestle frames selling instant noodles in Papua New Guinea as a development solution through their 'Creating Shared Value' work; although the supply chain provides jobs, conceptualising instant noodles as delivering humanitarian benefits must surely be questioned (Errington et al., 2012). Foster (2008) also analyses Coca-Cola's 'corporate citizenship' reports that do not address their actual products but still find that: "Employing and training workers, a precondition of making a profit, is […] offered with self-congratulations as evidence of good citizenship—especially in Africa, where the Coca-Cola system is the continent's largest single private sector employer with sixty thousand employees." (ibid., p.158)

Redfield (2012) provides case studies of public-private partnerships that can less controversially be described as humanitarian goods, including: pharmaceuticals to treat 'neglected' and less profitable diseases characteristic of developing countries, such as sleeping sickness; pre-packaged food products designed to treat malnutrition; personal water filtration devices, and; bags designed to facilitate the breakdown of human waste into compost in order to solve waste management issues in high density urban areas lacking sanitation infrastructure. Redfield notes that issues still remain, however, including moral debates over intellectual property rights for life-saving technologies. Again there is also recognition that such products only tackle the effects of poverty, not the causes. Another more promising example is the treadle pump technology described above (Smith, 2009).

Cross and Street (2009) describe Unilever Lifebuoy soap as one of the inspirations for Prahalad's (2010) book *The Fortune at the Bottom of the Pyramid* as it showed that public health could be both a social welfare project and a successful business venture. It was seen to exemplify how collaborations between the private sector, local government, NGOs and BOP entrepreneurs can function and how businesses can solve development problems without the need for philanthropy or compromising on profits. Yet Cross and Street (2009) describe how the anti-bacterial agent 'triclosan' was incorporated in the Lifebuoy soap made specifically for the Indian market, despite increasing concerns in the US over the negative health impacts of these types of agents in the longer-term. It was argued that the profit-making motivations of Unilever were being downplayed in order to promote the

soap as a social good, not the commodity it inherently was. In terms of development assistance, many local community leaders in India felt that improving access to clean drinking water would have been a much better focus for local governments to reduce the spread of disease, rather than putting time and money into the Unilever partnership.

The sale of the imported Lifebuoy soap was also seen to put Kerala's indigenous soap manufacturers at risk, many of whom had developed businesses with the help of more locally-targeted poverty alleviation programmes (ibid.) Equally, the example presented by Moxham (2006) where the World Bank promoted kiosks in Timor-Leste led to the undermining of local production due to the kiosks selling cheap imported products such as cooking oil, rice and coffee. In an attempt to counter this, the *aparajitas* in the CARE Bangladesh Rural Sales Program (Dolan et al., 2012) are allowed to sell locally-made products of their choosing in addition to products from the domestic and multinational partner companies, therefore supporting the local economy more broadly.

Roy (2012) argues that there is a need for the "ethicalization of market rule" in order "to take account of, and even mitigate, the exploitative character of bottom billion capitalism." (ibid., p.106). Seeing microfinance as a BOP product which has resulted in suicides amongst consumers in India shows that the world's poor are also potential victims of capitalist interests, as well as beneficiaries. Principles of consumer protection are now hoping to be harnessed through industry ethics codes in order to ensure "responsible" finance. Roy argues that similar frameworks need to be developed for bottom billion capitalism more generally.

In summary, the main areas of controversy in the market-driven development approaches described above are businesses and NGOs appropriating the traditions and social ties of the poor for economic purposes, promoting indebtedness, jeopardising local markets with imported products, and there being limited controls over what is presented as a humanitarian good. On the other hand, there are clearly cases in which individuals have benefited considerably from either being supported to become an 'entrepreneur' in a BOP-targeted market system or by being given access to goods that can help improve their standard of living.

2.4 Markets and development in sub-Saharan Africa

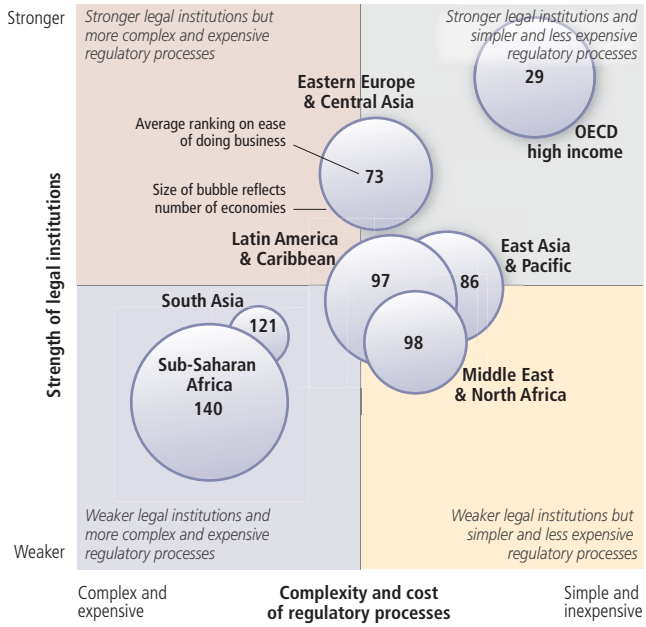
The 1980s were seen as a lost decade in development terms for sub-Saharan Africa due to the now widely acknowledged failure and damage of structural adjustment

policies (Lal, 2002). However, Taylor (2012) argues that there were some eventual benefits of these 'crude liberalization templates' once they had been refined over time and were able to contribute to reductions in government expenditure and interest rates and improved opportunities for private enterprise. The increasing private sector focus within development more recently has attempted to extend some of these opportunities further; almost every sub-Saharan African country has now adopted a private sector development programme of some sort at government level (ibid.) Despite this, there is still a limited proliferation of successful large-scale businesses in sub-Saharan Africa. For example, in 2012 not one of the Fortune Global 500, the list of the biggest corporations in the world by profit, had its headquarters located on the African continent (CNN Money, 2013).

Various reasons have been offered for the poor growth of the private sector in African countries. Taylor (2012) finds that some pessimists suggest that Africa does not have a 'culture conducive to business'. In response he asserts that business in Africa is in fact more prevalent than often presented, due to formal indicators continuing to ignore its multi-faceted nature. In their report on the African informal economy, the ILO (2009) estimates that up to nine out of every ten workers in both urban and rural areas have 'informal' jobs but that these often go unrecognised in official statistics.

Palmer (2004) attributes the high levels of informal economic activity in Africa to weakness and inaccessibility of the formal sector, high rates of rural to urban migration and rapid population growth. Figure 7 below shows that the average 'ease' of doing business ranking for sub-Saharan African countries according to the World Bank and IFC's (2013) *Doing Business* report is 140th out of 185 countries. The indicators used show weak legal institutions and complex and expensive regulatory processes. The costs of activities such as registering a business are calculated as a percentage of per capita income in order to make the comparisons. These trends are unsurprising given de Soto's (2001) assertion that high levels of 'extralegal' informal economic activity are generally a result of inaccessible formal frameworks. The importance of informal work to the GDP of African countries is now being increasingly recognised and given support within state and non-governmental development policies and programmes (Palmer, 2004).

Figure 7: Average ranking of sub-Saharan African countries in terms of ease of 'doing business' by comparison with other regions (out of 185 countries) (World Bank and IFC, 2013)



Note: Strength of legal institutions refers to the average ranking on getting credit, protecting investors, enforcing contracts and resolving insolvency. *Complexity and cost of regulatory processes* refers to the average ranking on starting a business, dealing with construction permits, getting electricity, registering property, paying taxes and trading across borders.

Post-development theory

Pessimism about Africa's current situation and future prospects has been argued to partially stem from an intentionally negative portrayal of the continent, along with other 'developing' regions, within development discourses and the media. 'Post-development' thinking has been the main source of criticism for development as a paradigm, with writers such as Escobar (1995) citing the 'development apparatus' as a vehicle for facilitating continued western hegemony over developing nations in post-colonial times. Payne and Phillips (2010) attribute the emergence of post-development theory to three contributing factors: the use of discourse analysis as a research tool; the realisation of the impossibility and unsustainability of achieving western-style 'middle-class living standards' for the entire global population, and; the apparent failure overall of the development project to achieve its stated aims.

Post-development draws heavily on Foucault's work on the role of particular discourses in covertly reinforcing power relations. Foucault's method for the exploration of power struggles using discourse analysis is discussed further in the following chapter. The method has been applied to development by various writers to show how the history of the language and the tools of development perpetuate its practices. Prominent writings include a collection edited by Jonathan Crush (1995)

entitled *Power of Development*, and another by Wolfgang Sachs (1992) called *The Development Dictionary: A Guide to Knowledge as Power*. In the introduction to the latter, Sachs draws attention to the 'web of key concepts' that development relies on that have arisen from western thinking: poverty, production, equality, the notion of state, and so on. He argues that development leads to the sanctioning of any intervention in the name of this higher goal and that based on its discourses, development completely overrides "the riches and blessings which survive in non-Western cultures" (ibid., p.5).

Many of the examples used in post-development literature are from case studies of development activities in sub-Saharan African countries. For example, through analysis of World Bank documents for a project in Lesotho in the period from 1975 to 1984, Ferguson (1994) illustrates how development discourse inevitably presents a particular view of the target country that opens it to development intermediaries as a viable case for intervention, even if that view differs wildly (such as in Lesotho) from academic discourse. In this way he finds that development discourse continually reinforces the need for development interventions through intentionally playing up the 'under-developed' view of developing countries. Bayart (2000) finds that marginalisation discourse has further exacerbated the negative image constructed of Africa:

> The vast literature produced by journalists and academics which refers *ad nauseam* to the marginalization of the sub-continent, or to its 'disconnection', even if it is only 'by default', does no more than reproduce Hegel's idea that this part of the globe is an 'enclave', existing in 'isolation' on account of its deserts, its forests and its alleged primitiveness. (ibid., p.217)

Recent work by Jerven (2013), for example, has also highlighted that national indicators commonly used to measure 'development', such as gross domestic product (GDP) per capita, are produced by national statistics offices that often have fairly limited capacity and resources in African countries. This leads to a paucity of data that is now known to have resulted in very low estimations for economic growth of African countries, illustrated by recent revisions of GDP for Ghana and Nigeria that nearly doubled the previous estimations after renewed data collection efforts (ibid.) Although the concept of development and what is taken to indicate progress towards it, as well as the subsequent use of data provided by national statistics, are all shaped by development discourses, there are also other factors that impact on how 'developing' countries are portrayed.

Trade, not aid, for 'development'

The realisation that the African continent has been negatively portrayed by development actors and more broadly, including in the media, has become increasingly widespread and resulted in concerted efforts to highlight the issue and promote a more positive image. For example, in 2012 a video entitled "Africa for Norway" was released by a consortium of Norwegian students and academics. It was funded by Norwegian development agencies and used a South African cast and production company to show-case a spoof new campaign called 'Radi-Aid' that asked Africans to donate radiators to the people of Norway, accompanied by images and description of the freezing conditions experienced by Norwegians in winter. Its purpose was to illustrate how negative stereotypes are produced and perpetuated: "Imagine if every person in Africa saw the "Africa for Norway" video and this was the only information they ever got about Norway. What would they think about Norway?" (Radi-Aid, 2013)

Although some key post-development writers such as Escobar (1995) are overtly anti-capitalist, an alternative response to the critique of the development paradigm as reinforcing conceptions of Africa as a continent in need of charity is a concerted effort to promote African countries as offering plentiful business and investment opportunities. Campaigns focusing on this often use the slogan 'trade, not aid'. This phrase is thought to have emerged originally to describe demands of developing countries at the first UN Conference on Trade and Development in 1964 for financial aid via the IMF to be replaced with a subsidies system for primary producers (Fridell, 2004). It has since been adopted by many initiatives and campaigns that try to reduce aid-based approaches and dependency.

Tony Elumelu (2013), a successful Nigerian businessman, has tried to take this further to promote an 'Africapitalism' concept. He states that:

> Africa never should have been a charity case. Our people are as industrious, innovative, and entrepreneurial as any on the planet. Economic growth over the past decade, even under some of the harshest conditions, has been nothing short of stunning. (ibid., p.6)

Elumelu suggests that the African private sector has not yet transitioned fully from short-term rent-seeking type investments to more long-term profit-making entrepreneurial activities and that to do that requires further funding and support of entrepreneurial activities, reduced foreign exploitation of mineral resources, and government efforts to create a better enabling environment through improved

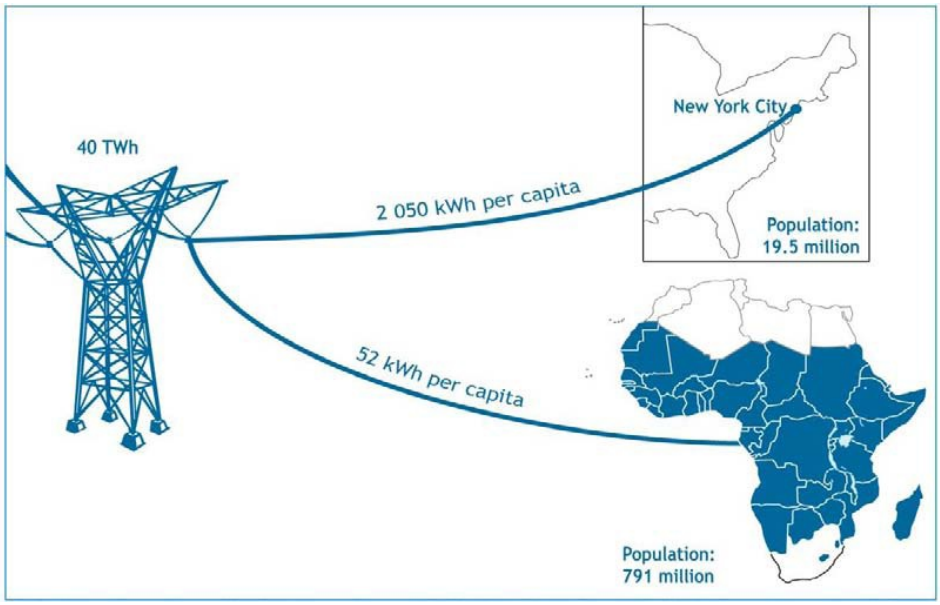
market infrastructure. He proposes that NGOs be involved in pushing for those market conditions and supporting entrepreneurs. Again, this returns to the model of private enterprises, development intermediaries and governments working together to create a conducive business environment and facilitate the growth of markets.

2.5 Energy access as a development problem

Whilst not wanting to reinforce the much-critiqued negative image created of developing countries and sub-Saharan Africa in particular, there are clear differences between countries termed as developed and those termed as developing with regards to living standards. One of the factors contributing to these differences is modern energy access, something that affects people directly and indirectly in terms of their ability to undertake productive enterprises. Again coming back to Sen's (1999) conceptualisation of development as freedom, limited access to modern energy services can be argued as a comparative restriction of personal agency.

Globally, just under 1.3 billion people have no access to electricity and 2.6 billion rely on traditional biomass for cooking, associated with serious environmental and household air pollution issues. The majority of these live in rural areas of developing countries. The problem is most acute in sub-Saharan Africa, where 72% of people lack access to electricity and over 650 million people lack access to modern cooking fuels (IEA et al., 2010). Figure 8 illustrates the resulting situation: based on 2009 data, total annual residential electricity consumption of the 791 million people living in sub-Saharan Africa (excluding South Africa) is roughly equivalent to the total annual consumption of the 19.5 million people living in New York State in the US.

Figure 8: Annual electricity consumption in New York and sub-Saharan Africa (Ibid.)



Although energy access is not included as a Millennium Development Goal in its own right, it has been recognised that modern energy services are essential for delivering most, or even all, of the eight Goals (GNESD, 2007). Accordingly, in September 2010 the UN Secretary General, Ban Ki Moon, announced a target of universal energy access by 2030. An enormous amount of work is required to meet this target (Practical Action, 2010) and energy access is the focus of many development intermediaries trying to contribute to its achievement.

A universal goal to "Secure Sustainable Energy" has also now been proposed for the post-2015 development agenda that is intended to take the place of the Millennium Development Goals once they expire in 2015. In a report compiled by the 'High-Level Panel of Eminent Persons on the Post-2015 Development Agenda' (2013), the illustrative national targets shown in Figure 9 are also proposed as a sub-set of the universal goal, to be reached by 2030.

Figure 9: Illustrative post-2015 sustainable energy targets to reach by 2030 (The High-Level Panel of Eminent Persons on the Post-2015 Development Agenda, 2013)

7. Secure Sustainable Energy	7a. Double the share of renewable energy in the global energy mix
	7b. Ensure universal access to modern energy services [1, 2]
	7c. Double the global rate of improvement in energy efficiency in buildings, industry, agriculture and transport
	7d. Phase out inefficient fossil fuel subsidies that encourage wasteful consumption [1,3]

The targets shown in Figure 9 indicate the extent to which energy access discourse has become intrinsically linked with the environmental agenda, so that the focus is

concurrently put on promoting renewable energy, reducing promotion of fossil fuels and encouraging energy efficiency.

Sustainable energy in developing countries

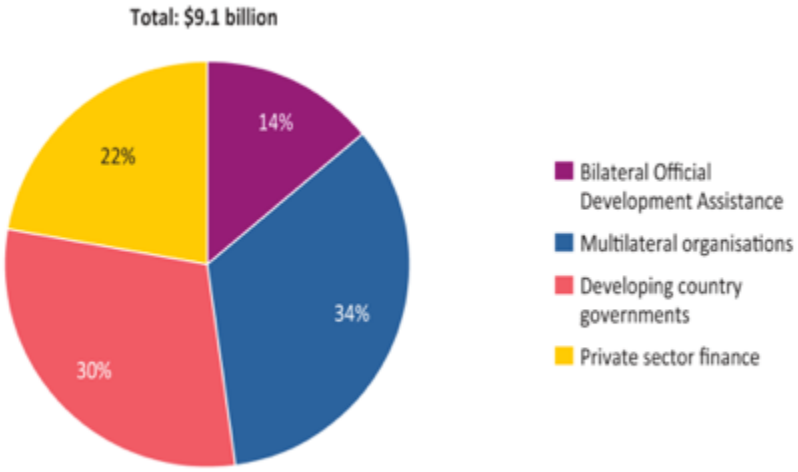
Renewable energy and energy efficient technologies for lighting, cooking and other energy-dependent activities, hereafter termed 'sustainable' or 'clean' energy technologies, have been widely recognised as offering viable, low-carbon energy solutions to rural populations in developing countries (Moomaw et al., 2011). There is now a large range of sustainable energy technologies available and a variety of configurations in which they can be installed. In line with the case study organisations, this thesis focuses on pico-solar photovoltaic (PV) products for individual households or business units, in the form of solar lanterns and lighting kits that provide light and often also electricity for other low electrical-demand activities such as phone charging. It also focuses on domestic-scale 'improved efficiency' cookstoves (generally referred to as 'clean cookstoves') that reduce the amount of cooking fuel consumed (commonly firewood or charcoal) compared to traditional cooking methods through high levels of thermal efficiency, and biomass briquettes which are made from various organic waste residues and can be used as a more sustainable alternative to firewood and charcoal. More details on these particular products are provided in Chapter 5.

Martinot et al. (2002) have provided a thorough review of approaches to disseminating renewable technologies in developing countries since their emergence. They found that donor organisations could still be inclined to provide large subsidies or even distribute equipment free of charge, despite clear evidence (i.e. previous failure of such programmes in the long-term) that these approaches are unsustainable and even harm the creation of viable markets. More recently, however, development intermediaries focusing on energy have followed the general turn in the development sector towards new market-based approaches. They have also been joined by private sector organisations, from small social enterprises to large multinational organisations, interested in creating and/or distributing sustainable energy products to the 'BOP', often in partnership with the more traditional development actors. For example, Jacobson (2006) asserts that:

> The single largest trend in international solar policy circles over the past decade has been to shift solar dissemination strategies from heavily subsidized donor projects to private market-based approaches that seek to achieve—or at least move toward—''full cost recovery.'' (ibid., p.145)

Figure 10 shows the OECD/IEA estimation of investment in energy access in developing countries overall in 2009, suggesting a total of US$9.1 billion was used to provide 20 million people with access to electricity and 7 million people with advanced cookstoves. Around half of this was provided by multilateral organisations and bilateral aid (48%), just under a third by developing country governments (30%), and 22% by the private sector – something that has been a relatively recent emergence in what has traditionally been seen as a development problem.

Figure 10: Share in total investment in energy access by source, 2009 (OECD and IEA, 2011)



Uptake of small-scale renewable energy systems in Africa has increased over time, particularly solar photovoltaic systems for homes. Growth rates are much slower than in other areas such as Sri Lanka though. In 2007, Africa had around 500,000 solar home systems in use but over half of these were in Kenya and South Africa, with numbers outside these two countries being relatively small (REN21, 2010). Market-based approaches and associated private sector investment have increased significantly in Africa in the last couple of years, however. Hammond et al. (2007) estimate that the total BOP energy market in Africa has a potential value of US$27 billion (characterising the BOP as those with a maximum annual income of $3,000 in local purchasing power equivalent). The whole purpose of their report "The Next 4 Billion: Market Size and Business Strategy at the Base of the Pyramid" is to encourage businesses to take up the challenge of designing BOP products and making a successful business out of their production and distribution. It provides various case studies of successful examples of this, such as the example of E+Co which is discussed further below.

Examples of market-based initiatives to supply sustainable energy products

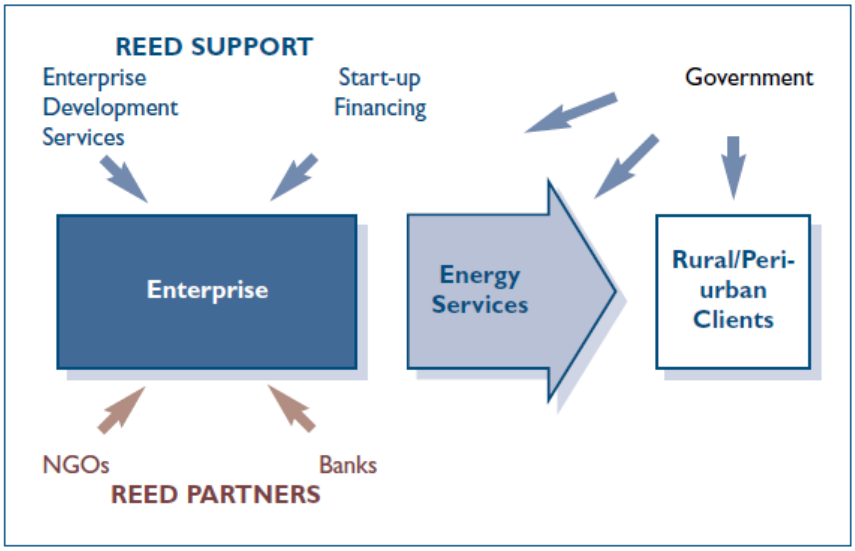
Martinot et al (2002) use the term 'market facilitation organisations' to describe "entities that support the growth of particular markets through a variety of means […] networking, information dissemination, market research, user education, partner matching, business-deal identification and facilitation, technical assistance, consulting services, financing, and policy advocacy or advice" (ibid., p.336). Through these measures, the organisations increase local supply-side business capability and capacity. Martinot et al. concluded that market facilitation can be a powerful approach for disseminating renewable technologies in developing countries, but that it was under-utilised at the time of writing. This section outlines some examples where it is now being applied.

One of the first widespread programmes to create and support local enterprises for renewable technologies was the UN's Rural Energy Enterprise Development (REED) programme. REED was a partnership between the United Nations Foundation, the United Nations Environment Programme, a non-profit company that specialises in clean energy investment called E+Co, and local NGOs in its countries of operation. In its 2003 report, the programme partners stated that:

> As experience with many clean energy technologies increases, so does technical progress, which has dramatically lowered the cost of energy from sources such as modern biomass technologies and wind energy. The focus has now shifted from one of technology, demonstrations and gifts to that of empowerment, markets and investments. (UNEP and United Nations Foundation, 2003)

The REED approach, summarised schematically in Figure 11, identified and nurtured local entrepreneurs to form enterprises that could produce and distribute modern energy services to local rural and peri-urban communities. The support provided included business development services and seed capital in the form of a loan or similar to help finance enterprise start-up. REED operated in Africa as A-REED, with operations in Mali, Ghana, Tanzania, Senegal and Zambia. The A-REED investment facility closed in 2007 (E+Co, 2011) but the individual partner organisations, including E+Co (international), ENDA (Senegal), TaTEDO (Tanzania) and the Mali-Folkecenter, appear to be continuing to use similar approaches.

Figure 11: The REED approach (UNEP and United Nations Foundation, 2003)



In addition to those original A-REED partners, some other 'market facilitation organisations' applying market-based development approaches to sustainable energy products in sub-Saharan Africa are described below.

- Global Village Energy Partnership (GVEP) International's Developing Energy Enterprises Project (DEEP) was set up in 2008 to provide business and technology training and a loan guarantee scheme to new and existing energy service entrepreneurs. (GVEP International, 2012a)
- British NGO SolarAid has established a social enterprise called 'SunnyMoney' to import micro-scale solar products into African countries, catalyse demand and establish supply networks. (SolarAid, 2011)
- The Rural Energy Foundation trains and supports commercial retailers and distributors of solar home systems and solar lanterns in sub-Saharan Africa. They provide training in technology, marketing, sales and business administration, with an associated micro-franchise option. (The Ashden Awards, 2010)
- The Enabling Access to Sustainable Energy programme focuses on removing bottlenecks in local energy markets through supporting the scale-up of sustainable business models. Facilitated by the Dutch organisation ETC International, it has a portfolio of nearly 40 projects in eight countries. (de Vries et al., 2010)
- Lighting Africa is a joint International Finance Corporation (IFC) and World Bank programme to support markets for off-grid lighting products, through market intelligence, product quality assurance, business support services, consumer education and public sector engagement. (Lighting Africa, 2010)

- The World Bank funded and GVEP-implemented 'Supporting Energy SMEs in sub-Saharan Africa' programme offers business training, access to finance and investment for small businesses involved with sustainable energy supply chains in Rwanda, Uganda, Tanzania, Kenya, Mali, and Senegal. (GVEP International, 2012a)

As well as an increasing focus on market-based energy access programmes by these more conventional development intermediaries, there has been an increasing number of social enterprises being set up in the energy access sector. This has particularly been the case for the design and distribution of pico-solar lighting systems and highly engineered clean cookstoves. Table 1 below identifies some of those companies.

Table 1: Examples of social enterprises for solar lantern and clean cookstove design and distribution

Technology	Company name	Country of origin
Solar lanterns and lighting/charging kits	d.light design	US
	Nokero	US
	Greenlight Planet	US
	Barefoot Power	Australia
	ToughStuff	UK
Clean cookstoves	Envirofit	US
	Burn Design Lab	US

Like SunnyMoney described above, Grameen Shakti is another example of a social enterprise set up specifically to distribute clean energy products. Wimmer (2012) provides a useful interview with its founder, Mohammad Yunus, describing how and why it was legally structured. It was set up initially as a company limited by guarantee, a legal format typically used by charities and meaning that it does not have shareholders and can therefore theoretically make losses without significant recourse. It was established to make solar home systems available to the poor in Bangladesh, and has also expanded to clean cookstoves and biogas systems. It became clear to Yunus, however, that the original legal structure allowed the operations to be carried out in a financially unsustainable manner. Therefore Grameen Shakti Social Business was set up as a social business, using the standard legal structure of a company limited by shareholders but setting up a charter declaring that the shareholders would only take their investment money back over

time and not receive any dividends. All profits would be invested back in the company instead. (Wimmer, 2012)

Policies to promote private sector investment in sustainable energy

Most of the activities described above involve a combination of private investment and development funding, often in the form of grants. Public and private funds are increasingly being committed to low carbon development initiatives in developing countries due to growing acceptance that the contribution of human activity to climate change represents a huge global risk. It is recognised that the energy consumption of developing countries will increase significantly over time and therefore efforts are being made to facilitate the additional energy generation being based on low carbon technologies. The Copenhagen Accord, for example, commits developed countries to providing significant additional funds – US$100 billion a year by 2020 – to developing countries to support climate change mitigation, adaptation, technology development and transfer and capacity-building (UNFCCC, 2009). To put this into perspective, the IEA et al. (2010) estimate that US$36 billion of investment annually could allow every citizen in the world to have access to electricity and clean cooking facilities by 2030.

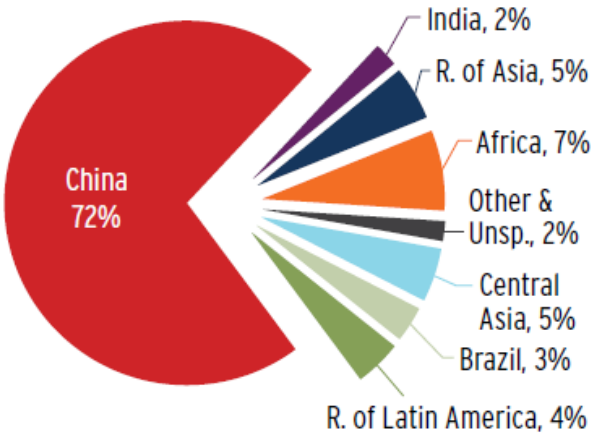
A 'High Level Advisory Group on Climate Change Financing' that included various heads of state was convened in 2010 to consider financing mechanisms for the Copenhagen Accord funding. Their final report described a need to prioritise channelling funding to Africa, including a possible 'Africa Green Fund' as a sub-mechanism of the main Green Climate Fund which will host the dedicated resources (UN, 2010). The Green Climate Fund will provide a mix of grants and loans to low carbon activities in developing countries. It is still under design but its architecture includes a 'Private Sector Facility' "which will address barriers to private sector investment in adaptation and mitigation activities, such as market failures, insufficient capacity and lack of awareness" (Interim Secretary of the Green Climate Fund, (2013) p.1).

An already operational source of finance for organisations involved in distributing sustainable energy products is through the sale of what have become known as 'carbon credits'. These tradable certificates are generated under specific policy mechanisms to promote increased investment in low carbon energy projects, amongst other project types, that otherwise might not be financially feasible. There are two main types of mechanism that facilitate the generation of carbon credits by projects in developing countries. The first is the regulatory system known as the

Clean Development Mechanism (CDM). This is operated under the UN's Framework Convention on Climate Change (UNFCCC) and allows eligible projects to produce and sell 'certified emission reductions' (CERs). These are measured in tons of carbon dioxide equivalent (tCO_2e) and signify the volume of greenhouse gas emissions avoided through the project's activities. The way in which this happens is discussed further in Chapters 0 and 6. The buyers of the CERs in the past have predominantly been developed countries that were required to reduce their greenhouse gas emissions under the Kyoto Protocol and were able to buy 'offsets' to constitute part of the reduction (Kossoy and Guigon, 2012). This led to carbon trading under the CDM becoming known as the compliance or regulatory market.

The World Bank (2010) estimates that the CDM leveraged around US$95 billion in clean energy investment between 2002 and 2008, compared to US$80 billion of non-carbon-finance-linked sustainable energy investment in developing countries over the same period, and just US$19 billion for climate change mitigation delivered through Official Development Assistance. This shows how significant a source of finance it has been. However, the CDM has been slow to take-off in sub-Saharan Africa compared to other regions. As shown in Figure 12, Africa as a continent only hosted 7% of CDM projects in 2009, compared to 72% by China (Kossoy and Ambrosi, 2010).

Figure 12: Primary CDM sellers in 2009 (Kossoy and Ambrosi, 2010)



(unsp. = unspecified countries)

Concerted efforts to increase the uptake of the CDM in Africa have been made and in 2011 more projects were registered in the region (Kossoy and Guigon, 2012). The scheme is currently suffering from lack of international agreement to either continue the Kyoto Protocol, which expired in December 2012, or initiate a new agreement

that will equally secure demand for carbon credits. However, the EU, which drives the majority of demand for credits from the CDM, confirmed its continued acceptance of them beyond 2012, prioritising credits from least developed countries (ibid.) – although this will exclude countries such as Kenya (UN-OHRLLS, 2013). Even if the CDM ceases to exist altogether, the EU intends to obtain carbon credits through bilateral agreements with least developed countries (Lewis, 2010).

The other mechanisms under which carbon credits can be generated and traded internationally are known as voluntary mechanisms. There is a wider variety of these and they work on the basis of organisations and individuals wanting to offset their 'carbon footprints' voluntarily, but still requiring a clearly structured way of doing so (Ecosystem Marketplace and Bloomberg New Energy Finance, 2013). Voluntary carbon trading mechanisms have been established by various organisations, such as a consortium of development intermediaries including the World Wildlife Fund (WWF) that created the Gold Standard system for carbon offsets (The Gold Standard, 2013). The voluntary market does see a slightly higher percentage of credits originating from the African continent, amounting to 10% of the 80MtCO_2e transacted in 2012. Some of these credits were generated by clean cookstove projects in Kenya, Ghana, Mozambique, Uganda and the Democratic Republic of the Congo (Ecosystem Marketplace and Bloomberg New Energy Finance, 2013).

Since they first emerged, the detailed processes of carbon finance mechanisms have been continually revised and new layers of complexity added over time. The intention is to make them more transparent and more accessible and thus inclusive, but various critics have found the opposite to be occurring. Gutierrez (2011), for example, analyses systems for gaining carbon credits from carbon sequestration in forests and describes how: "instead of unfolding and evolving into something different, it in-folds and becomes increasingly pervasive and convoluted" (p.641) in a process she terms 'capital involution'. She finds that "the resulting system excludes small-scale producers from the market and rewards mostly the few international agencies that validate the projects" (p.640). This discussion is taken up further in the following chapter.

2.6 Critique of market-based approaches to energy access

Much of the earlier discussion regarding the critique of the new wave of market-based approaches to poverty alleviation is also valid for initiatives focused on sustainable energy products. Clean, safe and affordable lighting and cooking

products are fairly easily reconciled with development aims, reducing one particular tension discussed earlier. However, the products must still be of appropriate quality in order to ensure that local sales entrepreneurs are able to maintain the trust of their social ties and that consumers do not spend their limited incomes based on false promises. At the same time, care is needed to avoid those involved in the distribution networks being encouraged into indebtedness and their social relationships subsumed into supply chains. Imported products and uneven subsidies can also jeopardise existing local enterprises.

Luther (2004) cites non-technological research and development efforts, such as development and investigation of dissemination strategies, as a fundamental requirement to achieve technology diffusion, yet there appears to be limited detailed analysis of market-driven approaches. Most academic studies into development interventions involving renewable energy focus on case studies that demonstrate the technologies as effective rural electrification solutions (e.g. Gupta (2003), Obeng and Evers (2009)) or analyse the barriers to their take-up (e.g. Chaurey et al. (2004), Ockwell et al. (2007)). Some of the existing studies on market-driven approaches to sustainable energy provision are discussed below.

Pico-solar products

Akrich (1992) and Cross (2013) have analysed the history of solar lighting products in two different periods of time that reflect the evolution of approaches. Akrich looks specifically at the early design of a photoelectric lighting kit by a French government-funded development agency. The end-users were excluded from the design process, so that when the systems went from Paris to rural areas of Senegal, problems quickly became apparent – such as the lack of a switch except on the light itself, which was often out of reach. There was also found to be a lack of replacement parts in local markets so that the systems were very difficult to maintain, and other issues meant limited success of the initiative.

Cross (2013), on the other hand, shows how the origins of social enterprise d.light Design's Nova S.200 solar lantern were much more conducive to the creation of a product that blended its humanitarian side with commercial viability. d.light emerged from a group project of Stanford University graduates well versed in C. K. Prahalad's work. They intensively engaged end-users in India in their design process and continue to incorporate feedback from users into the product's evolution over time. Rather than relying on traditional development funding, aside from initial grants from winning social innovation competitions, the product was

brought to market through engaging a suite of private investors on the basis of future sales of both the lights and associated carbon credits under the CDM. Interestingly, the d.light S.200 was revealed in 2010 at the 100th object chosen for the British Museum's exhibition 'A History of the World in 100 Objects' (ibid.), illustrating the significance that solar lanterns and similar humanitarian goods are perceived to hold.

As well as the design process, the distribution methods of pico-solar systems are key. Miller (2009) presents an extensive solar market analysis in "Selling Solar", focussing on the initially slow up-take and later accelerated diffusion of photovoltaic panels in countries such as Sri Lanka, India and Bangladesh. He suggests that, although well designed products were available, the main barriers were:

- the absence of consumer finance to make solar more affordable, and;
- the absence of a market infrastructure to make solar more available.

Balint (2004) compared two projects being implemented by small NGOs in El Salvador to introduce solar home systems to rural households. He terms one of the projects as 'market-based' because householders were given the opportunity to buy the systems, while the other was 'donor-based' as residents were given the systems free of charge in return for their commitment to local environmental schemes. The market-based approach involved the NGO partnering with one local firm, providing them with an initial number of solar home systems on the basis of repayment if sold successfully, and trained them as installers. They initially set up a demonstration project, installing systems in five households free of charge for a fixed period. The project was successful in some ways, and the villagers with the demonstration systems actually bought them slowly over time using a credit-based financing package. However, the only other customers were richer households and community development organisations, and ultimately the firm was unable to repay much of its initial debt. Luther concluded that: "Both partners underestimated difficulties associated with developing and nurturing a market for [solar home systems] in poor communities." (ibid., p.725)

Niethammer and Alstone (2012) examine the role for women in modern off-grid lighting markets, through a study of Lighting Africa's work in five sub-Saharan African countries. They find that the barriers to consumers can still be financial, since for "the average household or small business, a basic, good-quality lamp represents about one-fifth of their monthly income" (ibid., p.151) meaning that

significant planning is required to be able to make a purchase. They note that distributor finance is also an issue, but that indebtedness can be avoided. For example, Solar Sister, operational in Rwanda, Sudan and Uganda, offer a micro-consignment model whereby the first consignment of solar products are provided interest-free.

Kolk and van den Beuse (2012) assess four private enterprises that sell off-grid sustainable energy products in developing countries. Out of three companies they examine that sell solar systems, only Grameen Shakti in Bangladesh offers any form of consumer credit, delivered through their affiliation with Grameen Bank. Kamworks in Cambodia and Sunlabob in Laos both struggle to serve the poorest without subsidies or consumer finance options. They rely on sales of solar home systems to middle-income consumers for their main income and seek partnerships with donors for serving people that would be conceptualised at the BOP. However, Kolk and van den Beuse also note that: "Large, stand-alone donor programmes can distort local markets if they do not relate to local companies that need to play a role in longer-term solutions" (ibid., p.563).

Although the literature described here shows that there has been diverse research into the design of pico-solar systems, the reasons for their sometimes limited uptake and the relative viability of market-based approaches, there is less detailed analysis of the specific processes occurring to actually create the market infrastructure for these products. Cross (2013) describes d.light's partnership with Sahki Retail ("*sahki*" meaning friend) in southern India which recruits, trains and manages rural sales women in a manner similar to the Avon-model discussed earlier. D.light relies on this network of entrepreneurs and their existing relationships to make sure their solar lanterns are made available to the desired end-users. Wimmer (2012) describes some of the recruitment and training processes for Grameen Shakti solar engineers. Dolan (2012) also includes the Ugandan-based solar lantern distributor 'Solar Sister' in her review of 'BOP entrepreneurs', highlighting the importance of their training and experience over time:

> […] many women in these systems have long been 'petty entrepreneurs'; they have lengthy personal histories of market exchange and on-going reciprocal relationships through which they trade goods, favours and services. However, becoming a BoP entrepreneur requires the acquisition of a different cultural repertoire; one that emphasizes the values of responsibility, competition, risk-taking, a positive attitude and market discipline (ibid., p.6)

Cookstoves and briquettes

In "Whose Development", Crewe and Harrison (1998) provide a detailed ethnography of clean cookstove projects run by the British NGO Intermediate Technology, which later became Practical Action. Crewe undertook research for the NGO in Sri Lanka and was later directly employed as a social scientist at their UK headquarters, so the book is written from the vantage point of an 'insider'. It mainly critiques development interventions overall, particularly the paternalistic dichotomy created by the conceptualisation of developers versus beneficiaries. There is limited analysis of the intricate processes of the development intermediary's role in market-building but it does give a useful overview of the chequered history of cookstove dissemination programmes in general. Improved cookstoves entered the development agenda as early as the 1950s and many international organisations suddenly became involved in the 1970s after heightened awareness of deforestation rates, but often with little success:

> The claims about deforestation, and availability of funding, influenced national governments to concentrate on disseminating vast numbers of fuel-efficient stoves very quickly. Quality was often sacrificed on the altar of quantity. The technical performance of stoves was measured in relation to fuel consumption, despite the fact that in many places the stove-users were more interested in saving time than in saving fuel. The unpopularity of the new stoves was attributed to the cultural conservatism of their users. By the late 1980s Africa, Asia, and South/Central America became littered with abandoned 'improved' stoves. (ibid., p.11-12)

Many projects were therefore dismissed as failures and funding was significantly cut for cookstove projects in development, with this legacy remaining for a considerable length of time. Crewe and Harrison state that there have been many successes, however, with cookstoves often being popular with those who purchased them. They cite an example in Sri Lanka in the late 1980s where potters were trained to make clay liners for improved cookstoves. After assembly the stoves sold at subsidised prices, with funding often coming from international donors. This does not seem to have created any issues with distorting the prices, perhaps because there were limited other initiatives making and selling similar products. However, Crewe's research did find that the potters were becoming particularly wealthy and that this was creating tensions locally, as well as contributing to gender disparities.

Bailis et al. (2009) describe how a recently renewed interest in improved cookstoves has arisen from links between the use of solid cooking fuels with high rates of respiratory diseases such as tuberculosis. Cookstoves have emerged again as a

development solution, but this time in response to health issues instead of deforestation rates. However, they note that emphasis has now shifted to market-based approaches, so that organisations previously working in cookstove dissemination with donor support are facing pressure to move to commercialised approaches, potentially at the risk of not being able to provide cookstoves to lower income households. Other research gives credence to these concerns. Shrimali et al. (2011) interviewed 12 organisations selling clean cookstoves in India and found that only one had been able to become profit-making through an intentional targeting of commercial market customers only. Sesan et al. (2013) also found that a for-profit approach to selling alcohol-fuelled CleanCook stoves in Nigeria resulted in exclusion of 'BOP' consumers.

Bailis et al. (2009) argue that hybrid approaches that use a combination of donor funding and commercial activities to catalyse markets should not be discredited, citing the example of the Kenya Ceramic Jiko (KCJ) which emerged from donor funding to pay for design activities, local manufacturing facilities, ongoing training and public education. However, they also warn that the relative successes came at significant cost over time:

> The KCJ is now widely available across Kenya and its distinctive hourglass design has been replicated in markets across sub-Saharan Africa. By 2001, over 2 million Kenyan house- holds (roughly 40% of charcoal users) were using a KJC (Ministry of Energy., 2002). However, this degree of saturation took nearly two decades to achieve and was initiated by eight years of sustained funding equivalent to over a million dollars in current terms. (ibid., p.1700)

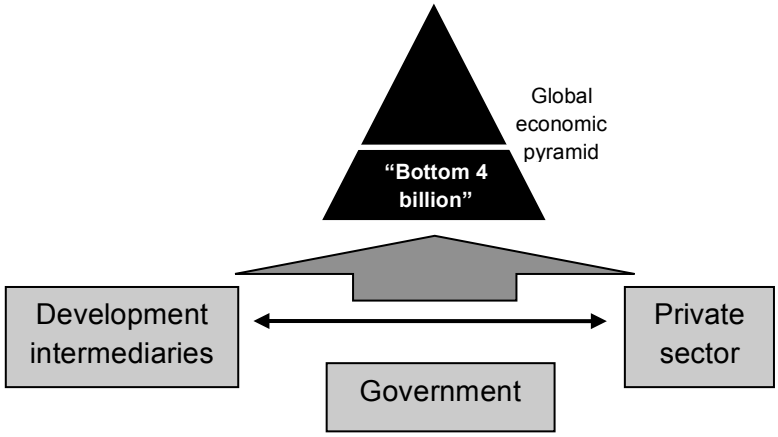
Limited analysis of market-based programmes to promote biomass briquettes can be identified in the literature on clean cooking technologies and fuels. Although clean cookstove research is relatively prevalent, unsurprisingly given the long history of the technology, it again seems to offer limited in-depth analysis of the detailed processes of creating market infrastructure, in terms of both the people and the technical requirements necessary.

2.7 Chapter summary

This chapter has reviewed activities and thinking in international development over time. It has shown the convergence in recent years of development approaches with economic principles of markets, and from the other side the encouragement of businesses to meet the needs of people at the 'bottom of the pyramid' in terms of income levels. This meeting of development with business (Figure 13) has led to an

increasing prevalence of market-based approaches to what have traditionally been seen as development problems, often involving collaborations between the private sector and more conventional development intermediaries, and/or the use of social enterprise business models.

Figure 13: The range of actors involved in designing and distributing BOP products (Source: Author)



This thesis will look specifically at market-based approaches to the distribution of sustainable energy products in sub-Saharan African countries. Widespread acceptance of the contribution of human activities to climate change means that grants and loans for low carbon development activities are available and increasing in volume. Particular efforts are being made to channel these financial resources to African countries, amongst other less developed regions. The availability of carbon credits may already have promoted activities in this sector to some extent.

An initial review of the literature suggests that more detailed ethnographic analysis of these types of approaches would offer a useful contribution, by examining the specific processes that occur when trying to build market infrastructure to make what can be conceptualised as humanitarian products available to potential low-income consumers.

3 Conceptualising markets and market-based activities

As described in the previous chapter, the absence of market infrastructure is seen as a key barrier to making new, clean energy technologies such as solar PV and clean cookstoves more available in developing countries. Both traditional development intermediaries and more profit-driven organisations are now trying to establish sub-Saharan African 'markets' for energy products targeted at off-grid rural 'consumers'. The primary conceptual framework chosen here to further develop the analysis of market-building is the work of Michel Callon and Koray Çalışkan on processes of marketisation.

This chapter provides an overview of the emergence of the social study of markets over time, briefly summarising the relevant work of early theorists and particularly highlighting the importance of Granovetter's (1985) 'embeddedness' concept. It leads to the more recent conceptualisation of markets as socio-technical assemblages and in particular Çalışkan and Callon's (2010) related call for a research programme for the study of markets that centres on this way of framing 'marketisation' activities. Connected concepts such as entrepreneurship, power dynamics, social capital, and trust are also drawn on in this thesis and are outlined here, completing the initial exploration of some of the key background literature.

3.1 The social study of markets

Although inevitably heterogeneous, markets do have common fundamental characteristics. Carruthers and Babb (2000) summarise these into four key elements, providing a helpful starting point on which to build the following discussion on the social study of markets.

1. Property and property rights: a market needs property, in the broadest sense of the term, that is to be exchanged, and a system that establishes clear rights to that property. It is in fact those property rights that are fundamentally exchanged.

2. Medium of exchange: fiat money (determined as legal tender by government law rather than due to any intrinsic value) is now the almost universal medium of exchange.

3. Buyers and sellers: a market requires both buyers and sellers of the property for exchange to go ahead. These can be referred to as actors in the market.

4. Reliable information: a well functioning market requires buyers and sellers to have confidence that everything is as it seems, with standardisation ensuring that actors can make informed judgements about the property to be exchanged.

These four elements provide the basic structure for a market to function. However, as the evolution of the social study of markets has shown, the way in which these different elements come into being and can be 'framed' for analysis is open to a more nuanced variety of approaches that have developed over time, each building on earlier concepts and often drawing on different academic disciplines.

Early theorists

The study of markets has traditionally been the domain of economists. Adam Smith (1759, 1776) first introduced the notion that the 'invisible hand of the market' would set prices of exchange according to supply and demand, based on the premise that individual humans want to maximise their own personal gains but thus leading to the benefit of society overall. The concept of rational self-interested actors later became known as 'homo economicus' or economic man, such as through the work of and reaction to the English political economist John Stuart Mill (Persky, 1995). In this way economic theory gradually created a conceptualisation of 'the market' as an almost naturally occurring system for the ordering of exchange and allocation of scarce resources through the decisions made by rational economic actors.

Early analysts that focused more specifically on the social nature of markets included Weber (Weber et al., 1968), who looked at the impacts of religious ideas and values on economic activities, introducing the idea that market activities are influenced by social relations. Durkheim identified how social contracts in the form of morality were a necessary precursor to industrial capitalism, even if he felt that that same capitalism would then lead to morality's decline (Fevre, 2003). Polanyi (1957) later went on to question the idea of a self-regulating market, laying the foundations of the embeddedness concept that was to become a central pillar of economic sociology.

Polanyi's work also highlighted that markets are not the only possible systems of economic exchange. While it is accepted that exchange of some form is generally inevitable in society (with an exception being the hunter-gatherer model), entire societies have functioned without the emergence of markets. Polanyi looked at the example of the Trobriand Islanders of Western Melanesia, where reciprocity and redistribution are the key aspects of exchange.

Beyond these examples, there has historically been limited sociological analysis of markets. It only became a prominent field in its own right in the 1960s, sparked by the spread of institutionalist thought, and leading to a subsequent boom sometimes termed as 'the new economic sociology' (Swedberg, 1994).

The embeddedness concept

White (1981) introduced the idea that stable production markets are only possible if actors take each other into account when making market exchange decisions. Shortly after, Granovetter (1985) started to develop the embeddedness concept, highlighting that:

> behaviour and institutions […] are so constrained by ongoing social relations that to construe them as independent is a grievous misunderstanding. (Ibid., p.482)

Granovetter suggests that the common neoclassical view is that pre-market economic behaviour, such as gift giving, was heavily embedded in social relations but that in modern society the market has increasingly deviated from social relations almost into its own independent sphere. In fact it could even be said that the view goes as far as seeing social relations now embedded in the market. Granovetter takes an opposing stance, seeing markets as embedded in non-market social relations, including institutions, networks and culture. Fligstein (1996) notes the partial success of the concept, demonstrated by evidence that it can explain effects that economic models cannot.

Granovetter (1985) particularly raises the issues of trust and malfeasance, which he describes as neglected prior to a 'flurry of interest among economists' (ibid., p.487) from 1970 onwards. Solutions that then emerged for how fraudulent market activities are prevented include the existence of 'generalised morality' (seen by Granovetter as an 'over-socialised' solution) and the creation of institutional arrangements that make malfeasance the less desirable option (seen as an under-socialised solution). While he accepted that these would play some contextual part in market-based transactions, he highlighted that the production of trust in economic life through social relations was key. Although trust could also lead to malfeasance, and in fact incidences of fraud are often only made possible because of the existence of trust, in general the desire to create and maintain trust and corresponding trust in others inhibits malpractice. Overall, Granovetter felt that although the embededness concept could not predict outcomes of economic interactions, it showed that ultimately the *detail* of social structure determines whether order or disorder will occur.

Callon (1998) asserts that Granovetter's embeddedness solution is frequently misinterpreted or under-estimated. By comparison with Polanyi's concept of embeddedness, which suggests that actors are embedded in the institutional context in which economic activities take place, he posits that Granovetter is describing that:

> […] the agents' identities, interests and objectives, in short, everything which might stabilise their description and their being, are variable outcomes which fluctuate with the form and dynamics of relations between these agents. (Callon (1998) p.8)

This distinction is important because it assimilates Granovetter's concept more closely to the 'actor-network' or 'assemblage' idea, discussed later on.

Networks, social capital and power

In addition to his embeddedness work, Granovetter (1982) undertook foundational work on the contribution of networks between people to personal agency. He looked at the difference between strong ties, for example when people are close friends, and weak ties, for example where they are merely acquaintances. Most people tend to have a group of close friends that are often also close friends with one another, and a few acquaintances who are unlikely to know each other. However, those acquaintances will have their own group of close friends. The 'strength of weak ties' theory suggests that by giving access to a whole new group of tightly associated people, acquaintances can be a more valuable resource than close friends. Granovetter backed this up with empirical evidence from job seekers, where those using weak ties to find jobs tended to have a much shorter or no period of unemployment than those reliant on strong ties. In essence, an actor's transformative potential and thus capability is enhanced or otherwise by the nature of the networks in which they are embedded.

Koniordos (2005) identifies the importance of support provided by informal networks ('close relatives, workmates, friends, ex-bosses, suppliers and even clients') for people setting up small independent businesses in Greece. He suggests that it is not necessarily strong or weak ties that are more important, but all possible sources are used for gathering information, suppliers and clients, and that without such resources the independent businesses would be unlikely to become established – certainly no example of this was found.

Based on the utility of networks for developing and maintaining business, relationships are often conceptualised as 'social capital' (Meagher, 2005). Fafchamps and Minten (2002) find it a key concept when studying markets:

> Understanding the role that social capital plays in market exchange is not just a playtoy for theorists, it is also crucial for policy, particularly for the design of institutions that support markets. To understand what functions these institutions must provide, it is useful to examine the role that relationships play in actual markets and the different channels through which they assist market exchange. (Ibid., p.2)

The origins of 'social capital' as a term are linked to the works of various sociologists such as Pierre Bordieu and James Coleman, in addition to those more focused on the utility of networks specifically like Granovetter. Its usage has been particularly analysed since it become prominent in development theory from 1993 onwards; the World Bank, for example, named social capital the 'missing link' thus far in development in a 1997 report (Harriss and De Renzio, 1997). Meagher (2005) warns against 'the social capitalist paradigm', suggesting that its restrictive conceptualisation can sometimes conceal more than it shows, with a particularly detrimental impact on studies of the informal economic sector in Africa. She argues that social capitalism tends to focus on the beneficial aspects of networks only, giving an "emphasis on the ability of social networks to provide an effective basis for economic development outside the framework of the state" (ibid., p.219). Not only can social ties in fact provide limitations in certain cases, she states, but reducing network observations to a simplistic description of weak and strong critically ignores finer-grained issues such as changing power relations. Nonetheless, social capital often features in analyses of market-based activities, often tied up with the notion of trust – such as in informal economic settings.

Trust and social contracts

Preda (2009) states that trust is "a fundamental condition of market transactions" (ibid., p.60). He finds that while institutional frameworks prevent malfeasance to some extent (by increasing the likely penalty and thus associated risk), trust is also created through networks of personal relationships which have their own "sets of tacit, as well as explicit rules, rights, and obligations, together with behavioural scripts" (ibid., p.60). These mechanisms based on social relationships become more fundamental where institutional frameworks are lacking, weak or inaccessible, such as in the informal economy. De Soto (2001), for example, describes how people operating in the 'extralegal' sector rely on informal systems of social contracts.

> The extralegal arrangements they cobbled together are explicit obligations between certain members of society to provide security for their property and activities. They represent combinations of rules selectively borrowed from the official legal system,

> *as hoc* improvisations and customs brought from their places of origin or locally devised, and they are held together by a social contract supported by the community as a whole and enforced by authorities the community has selected. (ibid., p.90)

In his study of Tanzanians in the African blackwood carving, or *vinyago*, market, Molony (2009) found that the most successful micro and small enterprises (MSEs) were those which developed the minimal levels of trust required for exchange to take place, despite a weak institutional context for creating trust through contracts:

> Trust and the need for direct, personal interaction through face-to-face contact — one of the most pervasive features of African MSE economies — emerge as a common theme across the case study industries and are likely to remain a crucial aspect of the way most MSE business is conducted. (Ibid., p.285)

Fafchamps (1996) examined contract enforcement in Ghana. As a conceptual framework, he uses the work of North (1990) and others that identifies three different types of contract enforcement mechanisms: those based on guilt, those based on coercion (legitimate or illegitimate) and those based on repeated interaction. The last of these is associated with trust and reputation. His study of Ghanaian companies illustrates the importance of long-term, personalised friendships, with companies expressing "an overwhelming preference to do business with people they already know, even if it means dealing only with a few people" (Fafchamps, 1996, p.444). The firms identified this as the best way of minimising contract default, and equally the motivation for their own contract performance was to maintain their profitable, long-term relationships.

Fafchamps' observation links with the notion of clientisation, which examines relationships developed through market-based transactions, rather than pre-existing relationships that help to shape the nature of transactions. Despite higher profits being available, actors in a market often prefer to deal with an established client, even in highly money-orientated markets such as commodity trading (Abolafia, 1998).

Fafchamps (2004) has also examined the importance of relationships to agricultural traders in Madagascar. His research shows that more successful traders have stronger and more relationships. In a survey, 62% of small traders, 73% of medium-sized traders and 77% of large traders felt that personal reputation and relationships were very important to their business. Fafchamps presents six main roles that relationships play in trade: business training and start-up support; information

sharing; regularity of demand and supply; credit; prevention of contractual breaches, and; risk sharing.

3.2 Markets as socio-technical sssemblages

Taking the embeddedness idea further, or perhaps as Granovetter intended (Callon, 1998), leads to the conceptualisation of markets as social constructs. This term recognises the importance of recurrent interactions between actors in creating social structure and applies it to markets (Swedberg, 1994). In essence, a market is a social construct because it is created out of repeated social interactions, with the market continuously being shaped by the nature and meaning of those interactions. However, the use of social construction theory allows limited consideration of technical, non-human aspects of markets.

Latour's work (1992, 2005) highlights how objects are often seen as 'dark matter', presumed to have no active role in social matters, yet the capabilities of technologies and meanings people associate with them in fact have an important role in how events unfold. This is particularly so when considering the design, manufacturing and exchange of seemingly passive objects as saleable and usable goods. Actor-network theory and science and technology studies with their 'insistence on assemblages of humans and non-humans' (Çalışkan and Callon (2010) p.9) have helped fill this void, leading to a new conceptualisation of markets as socio-*technical* 'agencements', usually translated as assemblages or arrangements.

Actor-network theory (ANT) was primarily developed by Michel Callon and Bruno Latour through their work within science and technology studies, such as writings on how an actor-network approach can explain the emergence of macro-actors (Callon and Latour, 1981). An 'actor-network' has a similar meaning to a socio-technical assemblage, whereby an entity with agency is not simply one human, rather it is the collective embodiment of human and non-human actors defined *by* the numerous interactions taking place with other human and non-human actors. It is not a static, permanent state where the networks can be assimilated to social ties. Instead, the interactions are brief moments of encounter, or 'associations' (Latour, 2005). The entities in questions are not cold, stable and independent humans with equally cold, stable links to others, but hot and unstable configurations, with their constant, dynamic flow of associations with others creating their agency. MacKenzie (2009b) notes the different use of 'actor' in actor-network theory compared to mainstream sociology. In sociology it is generally taken to denote a human being,

whereas in actor-network theory non-humans are also considered as actors, an aspect which has sometimes been controversial amongst sociologists.

Callon (2008) uses the term 'agencement' to describe actor-networks made up of physical forms, including objects, virtual systems and human beings, that have certain capabilities of action according to their combined capacities. Çalışkan and Callon (2010) note that use of the French term provides a sense of the specific configuration providing the capacity to act, through it sharing the same root as 'agency'. In essence, different configurations of objects, virtual systems and humans will produce different levels of agency. Çalışkan and Callon provide examples such as a pilot flying an aeroplane or an astronomer locating and studying new galaxies. MacKenzie (2009b) gives the example of a human with a calculator undertaking very different actions to someone without one. Another example is how access to information and communication technologies (ICT) influences the abilities and actions of market participants. Molony (2009) found that some blackwood carving traders in Tanzania who have access to ICT and are able to use it effectively do so to maintain their international business relationships.

Within the development sector, social capital, whereby humans have agency through their connectivity with other humans, is seen as both a potential input if an intervention draws on a target group's perceived social capital, and also as a possible outcome. An example of how provision of electricity access can contribute to social capital is provided in the PISCES project on bioenergy initiatives:

> […] access to modern energy itself is […] shown to play a major role in enabling social interactions after dark and establishing new social opportunities and as such also acts to build social capital. Street lighting in the cases involving electrification show this most clearly. (Practical Action Consulting (2009) p.33)

This example shows the relevance of actor-network theory, whereby agency is created through the assemblage or network of human and non-human actors and the interactions taking place between them. It goes beyond the human-only notion of social capital and demonstrates the significance of material aspects of configurations.

As well as being able to describe market 'actors' as socio-technical assemblages, the market system in its entirety can also be described as such.

Economisation and performativity

An important aspect of seeing the market and market actors as socio-technical assemblages is that it allows tools, terms and techniques derived from economics, the main descriptor of market activities, to be integrated into those entities and recognised as contributing to their agency. Çalışkan and Callon (2010) describe this as the 'performativity' of economics and highlight the importance of allowing "the reflexive or theoretical activity increasingly involved in market design" (ibid., p.4) to be incorporated into the analysis of marketisation, something that can be restricted within other conceptualisations. The 'economics' in question includes both academic economics and "the array of knowledges and the know-how on markets that non-academic agents elaborate and employ" (ibid., p.4). Callon summarises this as 'economics at large' (Callon (2007) p.330).

Polanyi (1957) again helped lay the foundations of this new area of thought, economic performativity, by linking up economic theories, such as those of British economist Ricardo's, with subsequent economic practice. Çalışkan and Callon (2009) discuss how rather than having an intrinsic 'economic' quality, things such as 'behaviours, organisations, institutions and objects' that are labelled as economic are in fact rendered so by 'processes of economisation'. Equally markets are rendered economic by the study and application of economic theory related to markets: "Markets are both the objects and the products of research" (Callon et al. (2007) p.5). This process can be termed more generally as 'performativity' since, as Callon (1998) posits in earlier work:

> […] economics, in the broad sense of the term, performs, shapes and formats the economy, rather than observing how it functions. (ibid., p.2)

As MacKenzie et al. (2007) describe, the concept of performativity originates from the British philosopher of language J. L. Austin (1962), who identified 'performative utterances' such as "I apologise" that enact the process through the saying of the statement. Various developments of the concept within sociology illustrated that wider conditions than simply the speaking of a statement also contribute to whether utterances are successfully perfomative or not. The performativity of discourse has been particularly prominent within gender studies, with Judith Butler (1990) as a key proponent of the theory that gendered identities are 'performed' partly through particular use of language. This focus on the power of narratives embodies a social constructivist approach. People's identities become socially constructed through

how they talk and how they are talked about, rather than through any inherent characteristics (Paltridge, 2006).

In *Markets of Dispossession*, for example, Elyachar (2005) particularly critiques the 'economisation' and thus appropriation of the poor's social networks when NGOs encourage newly framed 'micro-entrepreneurs' to render their relationships into 'economic' resources. It highlights the extent to which 'social' networks become 'economised'. The term 'actor-networks' shows how crucial networks are seen to be in the creation of agency, and this is equally the case in the construction of economic actors. The economisation of social ties through market-based approaches and the impacts that has should be considered, as per Elyachar and others such as Dolan and Scott (2009).

Çalışkan and Callon (2010) argue that the contributive work of 'economics at large' should be considered when analysing economic activities, including as a central part of any research into marketisation processes; they call it the 'performativity' programme. They also separate it from social constructivist approaches because of the application of the socio-technical assemblage concept described earlier. Some examples of the performativity of economics are more overt than others. MacKenzie (2006) provides the example of the Black-Scholes model, developed by the economists Black, Scholes and Merton. Through the widespread use of the same model amongst traders, patterns of prices were in fact shifted towards the model. In this way the market starts to respond in the way that it is modelled or conceived due to the influence of that model or conception, rather than due to any 'naturally occurring' movement towards a universal market form. It is equally seen in Çalışkan's (2010) account of cotton farmers undertaking market exchanges with traders. Farmers 'perform' characteristics that they are assumed to have – such as ignorance and stupidity – as a mechanism for empowering themselves against the people they interact with.

Çalışkan and Callon (2010) suggest that co-performation[3] affects all stakeholders in the marketization process, with NGOs and international agencies specifically included, depending on the market under consideration. Much of the literature on performativity in markets relates to economic models used within financial markets, however. Although little covered in the literature, it is possible that use of euro-centric (Njoh, 2006) or pure capitalist (Miller, 1997) market models as development

[3] 'Co-performation' is used to acknowledge the collective endeavour of performativity. It cannot be attributed to the work of individual entities or bodies, but rather: "[…] it is collectives that innovate. In these collectives there is no point in opposing those who articulate statements to those who make them function." (Callon (2007) p.334-335)

tools also entails performativity and thus risks excluding more locally relevant market structure options. Elyachar's (2005) critique of market-based development approaches in Cairo applying 'western' capitalist market principles seems to support this and sets the case for stepping back from a narrow perception of markets and their value basis.

The discourse around 'development' as a concept can also be described as performative more generally. Smith (2009) highlights this in relation to technology for development: "Prevailing thought regarding development, technology and modernization shaped the way in which development practitioners perceived the world, and influenced the solutions they sought." (Ibid., p.47). Mowles (2010) describes how:

> […] the grids and frameworks currently in use in most [international] NGOs are abstractions from a rich hinterland of lived experience: they are simplifications, sometimes reductively so. They are representations of reality, but ones which can cover over the messy business of trying to square experience with theory. Rather than merely reflect experience, when taken up uncritically by staff in INGOs they actively shape reality, as the abstractions take on a life of their own. (Ibid., p.762)

This phenomenon is similar to what post-development writers such as Sachs (1992), discussed in the previous chapter, have drawn attention to: how the language and tools of development perpetuate its practice. Crewe and Harrison (1998) provide direct critique of the simplistic dichotomy usually applied in development projects which splits those involved into "…developers and developing, donors and beneficiaries, rich and poor…" (Ibid., p.4). They argue that this in itself is detrimental, causing the idea to be continually reproduced or 'performed' through being a central underpinning of development programme design.

Calculative agency and market devices

In order for exchange to occur, buyers and sellers must have the ability to calculate what outcome they would find satisfactory. Callon (1998) describes two traditional views of how calculative agencies are produced: through cognitive psychology, or through cultural influence. While cognitive psychology is seen as too simplistic and to ignore the material tools needed for calculation, cultural influence is found lacking in explanation of differing calculative abilities and trends. Callon et al. (2007) term the pragmatic tools and systems that allow markets to function, in particular through configuring calculative capacities, as 'market devices' and suggest that this is an often overlooked area within social science. They define market devices as "a

simple way of referring to the material and discursive assemblages that intervene in the construction of markets" citing examples "from analytical tools to pricing models, from purchase settings to merchandising tools, from trading protocols to aggregate indicators" (ibid., p.2).

'Device' is again a translation of a French word, this time 'dispositif' coined by Foucault and alternatively translated into 'apparatus'. Foucault (1980) describes it as:

> […] a thoroughly heterogeneous ensemble consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions – in short, the said as much as the unsaid. Such are the elements of the apparatus. The apparatus itself is the system of relations that can be established between these elements. (ibid., p.194)

Much like the critique of social constructivism, Callon et al. (2007) stress the need to add material objects to this, showing that they act together with people and discursive elements to produce agency through their 'compound' capacities. Some examples studied in their book *Market Devices* include the tools used in financial markets, such as securities analysts' reports and financial charts, consumer-focused devices such as merchandising techniques and supermarket shelving patterns, devices for information gathering such as focus groups and consumer tests, product qualification devices such as classification systems and standardisation for pharmaceutical products, and price-setting devices such as those used by cotton traders. This last example is based on Çalışkan's (2010) research examining the construction of cotton prices through focussing on the large array of price-making devices evident across the global cotton value chain, all contributing to the final price realisation.

These kinds of market devices can already be seen to be of importance to the development of markets for sustainable energy products. Systems of quality standards for both products and the processes associated with their manufacture and sale can be described as market devices, for example. Analysis of case study bioenergy initiatives in developing countries for a Policy Innovations Systems for Clean Energy Security (PISCES) project showed that product standards were a key ingredient in developing trust amongst consumers. Having applicable standards for manufacturing processes was also seen to be important and an absence of these made it difficult for sustainability criteria to be adhered to, a key issue for the bioenergy sector.

Power struggles

Through his multi-sited global ethnography of cotton and how it is traded, Çalışkan (2010) concludes that the most appropriate conceptualisation of markets is as 'fields of power'. His work includes analysis of cotton trades in rural villages in Turkey and Egypt, where Çalışkan finds that notions of power are a key factor in producing differing perspectives of exchange from the farmers' versus the traders' vantage point. He therefore highlights an "…urgent need to study relations of economization as fields of power made and maintained by various human and nonhuman agents that confront each other on asymmetrical platforms." (Ibid., p.188). Çalışkan particularly highlights the importance of knowledge to cotton traders and the resulting focus put on activities such as networking in order to obtain knowledge. He also conceptualises pricing models as prosthetic tools deployed by traders to enhance their agency. On the other side of the global market, cotton farmers have limited access to knowledge of wider market activities and are excluded from market devices such as the pricing tools, resulting in their marginalisation in market exchange processes. Power asymmetries can thus be seen in the relationships between farmers, local merchants and global traders.

Foucault was a founding analyst of the relationship between power and knowledge, primarily focussing on the emergence of societal institutions such as prisons and mental health facilities. He particularly drew attention to the role of discourse in maintaining the power and control of the institutions whose history in society he documented. For example, in *Madness and Civiliation: A History of Insanity in the Age of Reason* (Foucault, 1967) he traces the emergence of the medicalised discourse which now shapes madness. This 'expert discourse' is perpetuated by a network of healthcare professionals and their associated institutions and can only be countered with competing expert discourses, thus giving experts in the field the power to shape attitudes more widely and restrict other ways of thinking as a form of control. As Lukes (2005) summarises:

> […] the power of domination requires, where it is not coercive, the compliance of willing subjects. Foucault's massively influential work purports to address the rich topic of the mechanisms by which that compliance is secured. (ibid., p.88)

Lukes describes how Foucault's analysis of power goes beyond formal or open conflicts. Foucault argued that examining only the repressive nature and examples of power leads to a very limited analysis and he instead advocated seeing power as productive and not held by elites, but acting through all individuals that operate in fields influenced by elites. In this way individuals are constituted as both the

products and vehicles of power, with power being anchored in the daily 'micropractices' of social life. Where individuals fight against power, the margins of power are set, but where subjects are susceptible to it they are shaped by it, responding to and perpetuating 'norms' of behaviour and regimes of truth, thus leading to unchallenged and covert control and regulation.

This explanation of power and Çalışkan's (2010) recognition of power assymmetries in market activities link us back to the importance of considering the performativity of processes of 'economisation' and 'marketisation'. It shows that the 'macro-actors' of market-making activities have greater control over market discourses and the emergence of market devices, leading to their inevitable empowerment in 'economic' contexts. It is again also relevant to the notion of 'development' and the post-development argument that 'development experts' hold power and control over the development industry and are able to shape and perpetuate its existence. Meagher (2005), for example, advocates for power issues to be considered when examining relationships in the context of development initiatives and social capital.

In practice, power struggles can be seen through the role of donors and their relationships with NGOs and recipients. Reith (2010) focuses on the movement of money through the aid chain to show the power imbalances between donors and NGOs that are caused by unequal access to capital. Based on the specific case of a small British NGO working in Uganda, she demonstrates how money is valued differently by each, with the NGO seeing it 'as essential for their ability to work towards their missions and ultimate survival' and the donors valuing it for 'the ability it gives them to influence development in the direction of their own agendas' (ibid., p.447). In their book on studying African NGOs, Igoe and Kelsall (2005) discuss the 'knowledge' surrounding NGOs and the organisations' own necessary roles in creating it. They again describe how the problem is reinforced by the pressure applied by donors that need to see justification for and efficacy of NGO approaches. These examples identify a need to challenge not only the success of development programmes in achieving their aims, but their broader ontological underpinnings associated with power and value (Practical Action Consulting, 2009).

Black boxes

The term 'black box' is a useful concept that appears in Latour and Callon's writings in science and technology studies and actor-network theory. It helps to describe how actors gain power through expert discourses, technologies and practices. In

Unscrewing the Big Leviathan (Callon and Latour, 1981), black boxes are shown to be a key part of the process by which macro-actors emerge in society.

> A black box contains that which no longer needs to be reconsidered, those things whose contents have become a matter of indifference. The more elements one can place in black boxes – modes of thoughts, habits, forces and objects – the broader the construction one can raise. (ibid., p.285)

In this way, the creation of black boxes is what allows micro-actors to gain power and grow into macro-actors. In *Science in Action* (Latour, 1987) the term is introduced as a reference to pieces of machinery or sets of commands that have become too complex to explain, resorting to a simple focus on what goes in and comes out (inputs and outputs) of the black box. The double helix shape of deoxyribonucleic acid (DNA) and a computer developed to model the shape of DNA on a screen are given as examples. Despite both this 'fact' of DNA shape and this piece of electronic equipment having long, complex and often controversial histories, they have become stabilised as cold 'black boxes' that are unproblematic.

Latour and Callon see black boxes remaining closed within sociological analyses. By comparison MacKenzie (2009b) highlights how analytical techniques derived from science and technology studies show the importance of opening up normally opaque black boxes: "to investigate the contents, normally hidden, of successful procedures and successful machines" (ibid., p.34).

Various procedures developed within carbon finance frameworks provide examples of 'black-boxing' that are particularly relevant here. As mentioned in the previous chapter, under the UN's Clean Development Mechanism (CDM) and various voluntary carbon offsetting frameworks, theoretical reductions in greenhouse gas emissions can be commoditised for monetary exchange as 'offsets' in the global carbon markets. In order to commoditise reductions in different greenhouse gases, a common benchmark of the estimated 100-year global warming potential (GWP) of carbon dioxide (CO_2) has become the reference point. All other greenhouse gases accepted within carbon offsetting frameworks are thus translated into the unit 'tonnes of CO_2 equivalent', or tCO_2e (Bumpus, 2011). GWP is measured through a combination of measurements and models of atmospheric and terrestrial carbon exchanges and long-term climatic impacts of gases. Although there have been varied estimations of and revisions to the GWP of different greenhouse gases in relation to CO_2 over time, the particular figures that were published by the Intergovernmental Panel on Climate Change (IPCC, 1996) when carbon finance

systems emerged in the 1990s continue to be used. Already a black box has emerged which is rarely delved into, let alone contested, by anyone other than the experts that created it (MacKenzie, 2009a).

In order to calculate reductions made by a particular project, such as the deployment of renewable energy technology, the tCO_2e that would have been emitted under a hypothetical 'business as usual' baseline scenario must first be calculated. Then the lower level of greenhouse gas emissions produced through use of the cleaner technology is calculated and the number of 'offsets' generated is the difference between these two scenarios over time. As Bumpus (2011) clearly explains, the materiality of technologies being deployed and their local 'socionatural context' contribute greatly to whether the carbon reductions are able to be commoditised or not. The problem of measurement ends up selecting those project types that are easier to measure. This partly explains the relatively late recent entry of cookstove projects, for example, into the world of carbon finance. On the other hand, Bumpus also posits that the need to engage local stakeholders to help solve the problem of monitoring the use of cookstoves (crucial for verifying the generation of offsets) reduces some of the assymetries in "power and bargaining positions between northern carbon capitalists and southern NGOs or groups in need of finance for their development projects" (ibid., p.629).

The market devices developed for framing and formatting greenhouse gases as carbon offsets are clearly highly complex and the black boxes that have emerged have given power to particular 'macro-actors' that created them. However, they also allow environmental pollution to be commoditised and thus absorbed and responded to within capitalist systems that might otherwise exclude the environment from economic valuations, providing calculative tools to do this.

3.3 Marketisation research agenda

Based on the conceptualisation of markets and market actors as 'socio-technical assemblages' and the notions of performativity, market devices and power, Çalışkan and Callon (2010) identify the need for an associated study of 'marketisation', a term used to describe "…the entirety of efforts aimed at describing, analysing and making intelligible the shape, constitution and dynamics of a market socio-technical arrangement" (ibid., p.3). To help frame the research agenda, they provide further conceptual basis by outlining three market characteristics. These are similar to those cited previously from Carruthers and Babb (2000) but incorporate the material and

technical aspects of markets, in addition to power considerations, in order to provide a more comprehensive picture:

1 Markets organize the conception, production and circulation of goods, as well as the voluntary transfer of some sorts of property rights attached to them. These transfers involve a monetary compensation which seals the goods' attachment to their new owners.

2 A market is an arrangement of heterogeneous constituents that deploys the following: rules and conventions; technical devices; metrological systems; logistical infrastructures; texts, discourses and narratives (on the pros and cons of competition, for example); technical and scientific knowledge (including social scientific methods), as well as the competencies and skills embodied in living beings.

3 Markets delimit and construct a space of confrontation and power struggles. Multiple contradictory definitions and valuations of goods as well as agents oppose one another in markets until the terms of the transaction are peacefully determined by pricing mechanisms. (Çalışkan and Callon (2010) p.3)

This three-part definition is used to show that despite markets taking many forms in practice, they all have some fundamental characteristics in common. In order to study and understand the diversity of markets, Çalışkan and Callon (ibid.) suggest five 'frames' which can be used to focus research towards the specific elements of markets that lead to their unique shaping. These are:

1 Pacifying goods
2 Marketizing agencies
3 Market encounters
4 Price-setting
5 Market design and maintenance

The pacification of goods and the nature of marketising agencies are described in more detail below, due to their particular relevance to this research.

Pacification of goods for exchange

> Markets are not possible without generating and then reproducing a stark distinction between the 'things' to be valued and the 'agencies' capable of valuing them. (Çalışkan and Callon (2010) p.5)

The first step of the emergence of a market construct is the creation of a product to be exchanged, around which process a market forms. Çalışkan and Callon (ibid.)

call this the pacification of goods, or 'objectification' – the work of making objects. This work is carried out both in the literal sense and in the framing sense. For example, innovation and development of new technologies leads to the physical creation of a new potential product, while numerous actors involved with the product in different ways confer multiple meanings and values on that product. This is not a simple, linear process however: product development and the emergence of meaning represent complex and continuous, dynamic, non-linear systems of interweaving technological and social processes. Using anthropology, in *The Social Life of Things*, Appadurai (1986) shows how commodities and humans are inter-twined in the processes of exchange and global circulation. Goods for exchange do not have to be physical and inert, however, but can cover a huge range of forms from knowledge and services to biological entities such as cells.

Although the specific materiality of objects does apply certain constraints, goods do not have pre-defined meaning or values (Çalişkan and Callon, 2009). In Callon's terms (2002), we can describe the processes of trying to fix these and thereby stabilise an object for exchange as 'qualification' and 'requalification', whereby the list of qualities attached to goods are repeatedly "attributed, stabilized, objectified and arranged" (ibid., p.199). An important part of the qualification process is the initial 'problematisation' (Cross, 2013). 'Problématisation' was first used by Foucault in discussions about the history of thought (Rabinow and Rose, 2003). In an applied use of the term, technology is developed in response to a highlighted 'problem' that frames the emergent technological solution. What problem is perceived and drawn attention to that a new product can solve? In their illustration of the social construction of technology through the example of the bicycle, Pinch and Bijker (1987) highlight the various problems presented and then 'solved' by different variations of what finally evolved as the bicycle. They show that there are numerous problems that might be identified, yet depending on the social group being considered with regards to the technology and the meanings that they associate with it, certain problems come to the forefront as *the* problem(s) to be solved. For instance, the perceived function of the bicycle varied from sport to transport, and the issues to be solved with earlier designs varied along with the perceived function, ranging from a desire for increased speed to demand for increased safety and reduced vibrations from cobbled streets.

Alongside problematisation and the presentation of an object as a solution, there are numerous ways in which the product and its value is further stabilised. These qualification processes often involve numerous market devices, from

standardisation and quality frameworks that lead to consistent products and quality assurance labels, to packaging and marketing materials, to contracts for the longevity or replacement of the product through warranty schemes. Successful application of market devices can help increase the perceived value of a product for sellers and buyers. Both sides of the market exchange also draw on price-setting devices that help translate value into monetary terms, named 'valorimeters' by Çalışkan and Callon (2010). An example is the classic 'cost + margins' formula (ibid., p.18). Price construction is part of a negotiation process, which is momentarily resolved at the point of exchange.

Marketizing agencies and the creation of entrepreneurs

> A multiplicity and diversity of actors compete to participate in defining goods and valuing them. (Çalışkan and Callon (2010) p.8)

These actors come together to create a market socio-technical assemblage around a specific product, and indeed each actor can be conceptualised as a socio-technical assemblage as well as constituting a part of the overall market socio-technical assemblage. Since they have 'marketising agency' they will be referred to here as 'marketisation actors'. Although the list of those involved in any one market may be huge, they suggest that studies of marketisation cases should start by identifying some of the relevant stakeholders. NGOs are included in Çalışkan and Callon's list of as one of the "well known forces that set markets in motion" (ibid., p.8). They cite Elyachar's (2005) ethnographic work on micro-entrepreneurship development programmes in Cairo in the 1990s as one example of development intermediaries being analysed as marketisation actors.

The entrepreneurship approach is being seen increasingly commonly in development approaches, as discussed in the previous chapter. It involves development intermediaries supporting local entrepreneurs to become economic actors within market chains, 'economising' them through enabling their acquisition of 'the competencies and skills' which Çalışkan and Callon (2010) describe as a constituent of effectively functioning markets. Once the 'entrepreneurs' have been endowed with the necessary market tools, they can render their own activities, tools and networks 'economic' and become actors of marketisation themselves.

If some marketisation actors are training 'entrepreneurs,' it seems useful to consider further the history and application of this term and particularly how it relates both to African contexts and to the field of international development. Hart (2000), in his anthropological work on the Ghanaian Frafra and their relationship with money,

notes that: "The term 'entrepreneur' is used in social science and history to denote a bewildering variety of types" (Ibid., p.104). This includes its wide use within anthropology to describe anyone who does something novel to generate money; within this definition he identifies many of his research subjects within the informal, and often illegal, economy of the Frafra community as exhibiting entrepreneurial characteristics.

Roy and Wheeler (2006) found that entrepreneurship in West Africa seemed to derive mostly from necessity and a lack of alternatives. "In UFWA [Urban French West Africa], the basic physiological and safety needs of many of the poor are neither adequately met nor secure. Thus the primary motivation of most micro-entrepreneurs whom we interviewed, particularly the poorest, was first to provide for their own physiological needs and those of their family, and then to provide a home (or at the very least roof) and security for the household." By contrast, in industrialised countries where basic needs are already met, entrepreneurship has been found to be motivated by higher-order needs such as self-esteem and self-realisation (Mulvehill, 2003).

Callon (1998) reminds us that through literal translation of the term, an entrepreneur can be described as a person who creates profit 'from being between others'. He cites Burt's (1993) work on entrepreneurs using structural holes within networks as a business opportunity: a lack of existing connectivity between entities is an opportunity for brokerage. This builds on Granovetter's (1982) theory of 'the strength of weak ties'.

Hart (2000) highlights that the classical definition is associated with the creation of enterprises that combine the factors of production (land, labour, capital, technology). This draws from Schumpeter's (1934) identification of entrepreneurial innovation as a main factor in economic development, leading to the term 'Schumpeterian entrepreneur'. This does suggest that there may be other types of entrepreneur too, but in general neither these nor a more general definition have been forthcoming. Despite entrepreneurship's increasingly accepted pivotal role in a market economy, therefore, the questions of who is an entrepreneur and what does their entrepreneurship entail remain unanswered (Hébert and Link, 2009).

Interestingly, Schumpeter's conception of entrepreneurs identifies them as individuals of 'supernormal ability and ambition' (cited in Preda (2009) p.80), able to generate trust through their charisma. Preda (ibid.) suggests, however, that this is only relevant within legitimate and well-structured exchange where marketing and

advertising devices play an important role. In less formal economic activity, by contrast, entrepreneurs are likely to rely on existing social networks to find business opportunities as seen in Hart's (1973) analysis of the Frafra in Ghana .

Davidsson (2004) provides a useful overview of the varying definitions of entrepreneurship and suggests that the term should be restricted to market-relevant contexts, so that entrepreneurship entails "…the introduction of new economic activity that leads to change in the marketplace" (ibid., p.8). A key aspect here is 'new', which could range from offering a new product or a new package of a pre-existing product, to adoption of a new business model or entry of a new competitor or start-up into a market. Since this research focuses on relatively new products and encouraging new competitors to provide them, it could perhaps give validity to development intermediaries referring to the individuals they support as 'entrepreneurs'. It also makes the process by which these entrepreneurs are identified and picked out for support of particular interest. Are the development intermediaries looking for certain characteristics? And what entrepreneurial aspects might they subsequently demonstrate?

Actors and agents

In the literature reviewed, the terms 'actor' and 'agent' are both frequently used, often interchangeably. For example, an entrepreneur might be described as an economic actor or a market agent. Giddens (1984) defines an agent as an individual or entity with 'transformative capacity', thus using agency in reference to capabilities. Defining an agent in terms of their transformative capacity helps make further sense of the actor-network concept that the networks an agent is a member of actually constitute the agent's characteristics. To avoid confusion with more colloquial uses of the term 'agent', however, the commonly used sociological word 'actor' will be adhered to in the analysis work of this thesis.

3.4 Chapter summary

This chapter has outlined the conceptual framework that will be used to position this research within the study of marketisation processes. It describes Çalışkan and Callon's (2010) call for a research programme for the study of markets, built on foundations of the socio-technical study of markets, including within economic sociology, anthropology of objects and science and technology studies.

Although detailed ethnographic and other academic research into development interventions has been relatively prevalent over recent years, there appears to be

limited analysis specifically targeting development intermediaries as having a role in marketisation processes. Elyachar's (2005) book *Markets of Dispossession* is one example and there has also been interest in the recruitment of local 'entrepreneurs' to serve 'bottom of the pyramid' (BOP) markets and the harnessing of their social networks for selling products.

This thesis will frame development intermediaries using market-based approaches as marketisation actors that actively configure and sometimes participate in markets for 'humanitarian goods'. Conceptualising markets as socio-technical assemblages brings to the forefront notions such as market devices, black boxes and the pacification of goods for exchange. These terms and more of those described above will be used here as tools for the analysis of ethnographic data on marketisation processes.

4 Methodology

This research uses ethnographic methods to gain insight into development intermediaries' efforts to establish and grow rural markets for domestic-scale clean energy products in sub-Saharan Africa. Participant observation was undertaken for five continuous months each within two case study organisations in order to examine the design of their market-driven programmes and the socio-technical structure of the emerging markets. The research can be termed as inductive, which is typical for ethnography (O'Reilly, 2005). Mosse (2001) explains inductive research as: "an open-ended concern with project contexts and happenings rather than the modelling of expected change from known inputs" (ibid., p.164). While ethnographic research therefore does not start from a rigid hypothesis, a point highlighted by classical ethnographers such as Malinowski and Humphreys as one of its advantages (O'Reilly, 2005), it still requires guiding questions that draw from the existing literature and theory. These are outlined below, followed by further detailed discussion of the methods used to respond to them.

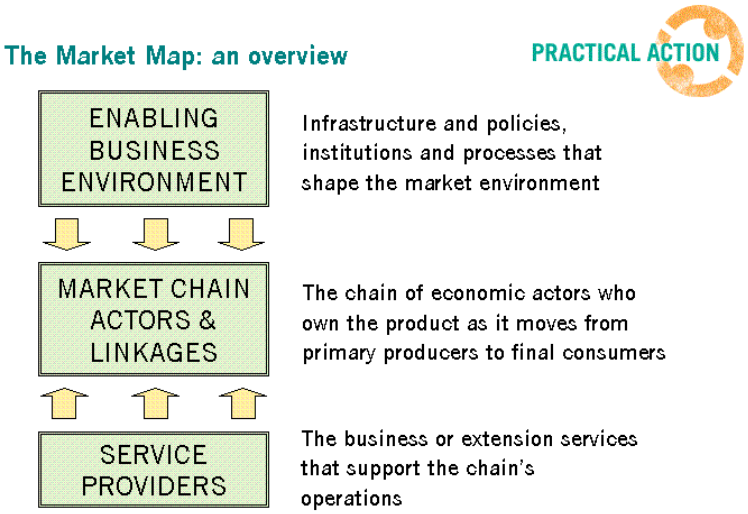
4.1 Research questions

The research and this thesis are shaped around four main research questions:

1. What marketisation activities are the case study development intermediaries undertaking?

This question has partly been answered through the creation of market maps that indicate how the development intermediaries sit within the markets for clean energy products that they are involved with. This follows Çalışkan and Callon's (2010) recommendation that studies of marketisation cases should start by identifying relevant stakeholders, even if it is impossible to identify *all* of those involved. Market maps following Albu and Griffith's (2005) template (Figure 14) were developed to illustrate the market actors and linkages, enabling environment and supporting service providers.

Figure 14: Market mapping template (Albu and Griffith, 2005)



Chapter 5 starts the response to the first research question by identifying the initial 'findings' of the research. The case studies are attended to independently of each other, describing the country contexts, the organisations and their market-based programmes in detail. The market mapping is used as a presentation tool to help demonstrate general observations of programme structure, in addition to being a preliminary analysis tool. The question is then more extensively answered within the responses to the other research questions, which form three 'frames' that guide the in-depth analysis.

2. How are the clean energy products stabilised, qualified, valued and priced for exchange as market goods?

For the second question, the clean energy products themselves are framed at the centre of the analysis and their stabilisation as 'humanitarian goods' is detailed. This is followed by an examination of the processes of qualification (in Callon's sense of the term), valuation and pricing that occur through the application of cognitive and technical tools by various market actors. A particular focus is on the role of market devices that are used to add value to products, such as warranties and carbon credit methodologies, and the power dynamics that emerge through market actors' differing levels of access to them.

The question is responded to primarily in **Chapter 6**. From here onwards the analysis of the two case studies is combined in order to draw out common characteristics and contrasting features.

3. What processes render people into 'local entrepreneurs' and thus economic actors?

The focus is then shifted to the 'local entrepreneurs' as the next frame of reference. The local entrepreneurs and dealers are those actors who are drawn into the development intermediaries' marketisation programmes as participants in the distribution chains of clean energy products. Their recruitment, training and evaluation are specifically focused on, with the availability and utility of cognitive skills, social networks and technical tools analysed at each stage. Consideration is also given to beneficial and negative aspects of the 'economisation' of these local actors by external forces. **Chapter 0** addresses this research question.

4. What factors affect the agency and actions of the development intermediaries as marketisation actors?

For the final question, the framing is shifted to the development intermediaries. The different demands put on them and their responses to roles as both development actors and marketisation actors are considered, with some comparative analysis made between the two case study organisations. The wider impacts of a shift towards market-based approaches within international development are also analysed and more practical lessons for policy and programme design sought. The question is responded to in **Chapter 0**.

Chapter 0 brings out the main points identified in the analysis within each chapter and synthesises them into one set of conclusions. It also includes a discussion of the limitations of the research and recommended further research.

4.2 Epistemological overview

Undertaking participant observation within development-related organisations as a research method draws on the field of development anthropology. Gardner and Lewis (1996) note that the late 1980s and 1990s began to see development anthropology "treating institutions, political processes and ideologies as valid sites of ethnographic enquiry in themselves" (ibid., p.68). This thesis examines the role of development intermediaries in helping facilitate markets for domestic-scale clean energy technologies. The aim is not to add to the critique of development as an industry or academic field, but rather to analyse the role of different actors and processes in market-building efforts.

The boundaries of this research varied according to the different levels of analysis. As described by Geertz (1973), ethnography is inherently microscopic. Although the participant observation took place within a fairly limited spatial area at the 'micro level', however, the research still needed to take into account macro-level influences (Knorr-Cetina and Cicourel, 1981) such as international carbon finance frameworks, for example. The research was also inevitably bounded by time. Blaikie (2010) terms short-term, 'snap-shot' research as 'cross-sectional', meaning that it is restricted to the present time, as opposed to 'longitudinal' (extended over a period of time). Ideally, the fieldwork period would have been long enough to bring a longitudinal aspect to this study, but the five-month timeframe available for each case study is acknowledged as a limitation. It was not possible to address specifically longitudinal questions such as 'are the programmes successful over time?'

The research is based on two case studies. Some suggest that case studies should be chosen with the aim of making generalisations (Gerring, 2004) but this is not an intention here. Although development interventions often follow similar trends or 'paradigms' in their design, two case studies cannot be representative of all market-based development interventions involving small-scale energy products. This follows Hancké's (2009) assertion that: "Case studies are not made for generalizations, should therefore not be used for that purpose, and intellectual honesty suggests that you simply avoid any reference to that possibility altogether." (ibid., p.61)

A further issue of generalisability is the broad geographical area covered: sub-Saharan Africa. Keller (1991) notes that:

> Academics who express views on Africa always do so on the basis of limited empirical experience. They generalise according to the small corner of Africa with which they are familiar to a greater or lesser extent. In fact, nowhere does the temptation to succumb to such continent-wide generalisations appear to be as strong as it is for Africa. (Ibid., p.50)

While it seems excessive to suggest that all academics base views on Africa on limited empirical evidence, Keller's overall message is valid. The decision to focus on sub-Saharan Africa here is due to its common use as a geographical remit for the development intervention programmes being studied. Many of the programmes identified in Chapter 2 apply the same basic design across numerous sub-Saharan African countries. However, the analysis has again tried to avoid generalisations and keep the unique context of each case study location in mind, with Chapter 5 describing these. It is acknowledged, though, that the depth of analysis in this

regard has been restricted by the research being so multi-sited (taking place in multiple locations across Kenya, Uganda and Malawi), so that it was not possible to thoroughly explore every context and its specific influence within the boundaries of this thesis.

The two case studies for this research are:

- Global Village Energy Partnership (GVEP) International's Developing Energy Enterprises Project (DEEP), focusing on its implementation in Kenya and Uganda
- SolarAid's social enterprise SunnyMoney, focusing on its implementation in Malawi

The case studies are presented fully in the following chapters; how the number of cases was chosen and the process of case selection are described in Appendix A. They were essentially self-selected on the basis of suitability and accessibility, but there were some unintended yet interesting contrasts and similarities between the two cases that subsequently benefited the analysis:

- GVEP International is a charitable organisation, whilst SunnyMoney is a social enterprise registered as a for-profit business – albeit one owned by a charitable organisation (SolarAid) and with a socially motivated agenda. This contrast between the two case studies allowed for a greater breadth of observation of different organisational set-ups across the development and business spectrum.
- Both organisations are headquartered in the UK, a factor that was probably instrumental in being able to gain access to them through existing connections and visits to their London offices, and useful for ongoing contact following the participant observation periods.
- All three of the countries of focus are ex-British colonies, useful from a practical point of view due to English being widely spoken.

A more detailed description of participant observation is also provided in Appendix A. My participant role within both organisations was ultimately akin to being an unpaid 'intern'. When with GVEP International, I was specifically tasked with supporting the new Monitoring and Evaluation Officer, a position that gave me access to their monitoring data and facilitated direct observation of the collection process. It also provided a useful reason for visits to the numerous 'entrepreneurs' that they supported as part of my data collection and checking activities.

For SolarAid, I had several roles but the one that became most prominent was again supporting their collection of 'social impact' data. For this I specifically had to engage with some of the schools and market areas that they had been or were about

to sell solar lanterns in. Once again this gave me detailed access to certain aspects of their programme activities. The particular roles I undertook inevitably had an influence on the viewpoints I had of the organisations, but being able to observe more general day-to-day activities in the offices and on work trips helped broaden out the findings.

4.3 Data collection

A fundamental element of ethnography is data collection. Participant observation traditionally uses fieldnotes as the main means of recording data and these were certainly the primary tool for this research. Observations were recorded without too much pre-selection of what was important and what was not, although since it was impossible to record everything observed some level of selectiveness was inevitable. The first step for recording an activity was noting systematic characteristics, specifically time, location, people present and primary language used. The next step was to record the activity itself. Recording conversations was the most difficult aspect but seen as important both for subsequent analysis and for enriching the written analysis with conversational extracts. Conversations were therefore noted as fully as possible. A recording device was not used because it was felt that producing one would have reduced the natural feel of otherwise informal conversations, possibly producing a more guarded encounter.

For conversations that involved local languages, I had to consider whether or not to engage a translator. For various reasons, however, the most practical solution was to allow the staff of the organisations to act as translators when necessary. Thankfully they always seemed willing to do this. Inevitably it meant that the translated versions I received may have been abbreviated and/or altered to some extent, but on the whole it felt that this was minimal and from the expressions of the people involved it was generally possible to verify that the translation was in the right vein at least. There was also never any particular reason to assume it would not be, as colleagues seemed perfectly willing to translate negative comments from people dissatisfied with their involvement with the organisations where necessary.

One of the reasons for avoiding use of an independent translator was that it might have appeared as mistrust of my new colleagues. Maintaining good relations with them was felt to be more important to gaining a deep insight into the organisations than the benefits that may have been gained from using an independent translator. Furthermore, having a translator present would have added to the number of people present at each interaction. Like the point about using a recording device, it

was felt that this could create an increased level of unnaturalness compared to myself being the only 'additional' person. The third reason was that the research ended up involving conversations in a large range of languages, often at short notice, so that it would have been very complex to make sure that an appropriate translator was always found and made available at the right time.

Obviously there were certain limitations to the approach, however, such as detailed discourse analysis becoming effectively impossible. In order to reflect the approach used, in the analysis chapters no direct quotations have been provided from non-English conversations due to them only being heard second hand. I was also unable to talk to some people out of the presence of colleagues from the case study organisations. This is seen as a relatively minor limitation though, since I felt that I was seen as part of the organisations in any case – hence there was no reason for responses given to me to be any different to those given to the staff members.

Fieldnotes were written as frequently as possible, either as the activity occurred or as soon after as possible. As highlighted by Hammersley and Akinson (1995) (p.176): "Most fieldworkers report that while they can train themselves to improve recall, the quality of their notes diminishes rapidly with the passage of time; the detail is quickly lost, and whole episodes can be forgotten or become irreparably muddled." Due to the overt nature of the research, it generally felt acceptable to take notes during observation, but in some cases the activities I was carrying out on behalf of the organisations made simultaneous note-taking difficult. In these cases they were made as soon as possible thereafter. The initial fieldnotes were handwritten in notebooks and then type-written each evening or at the earliest opportunity, with any previously omitted observations added in.

In addition to fieldnotes, other documents and artefacts were collected where relevant and available, such as training manuals and newspaper articles. I used a camera as frequently as possible for taking still photos, seeking permission beforehand. Many of these photos have been used for illustration in this thesis. Where the analysis has drawn on collected artefacts, these have been referenced as appropriate.

Semi-structured interviews

The participant observation included numerous informal conversations where I generally had the opportunity to ask questions at will. More formal semi-structured interviews were also used, primarily to engage with representatives of other organisations outside of the case studies. These were useful for finding out about

their perceptions of and interactions with the case study organisations, and detailed information about their own approaches. Semi-structured interviews were also undertaken with individual members of staff of each of the case study organisations in the country offices. They were conducted towards the end of each fieldwork period once knowledge gaps or issues needing clarification had been identified. Hammersley and Atkinson (1995) note that combining participant observation with interviews allows the data from each to illuminate the other.

The full list of interviews undertaken with external organisations has been provided in Appendix B. Each interview has been given a number that is used for reference within the analysis chapters where possible. However, in some cases this would have contravened confidentiality requirements, so for this reason not all direct and indirect quotations have been referenced. The interview list only includes the name of the organisation and the general job description of the person or people interviewed; no names of individuals are given. At the beginning of each interview every respondent was asked if the name of the organisation needed to be kept confidential or not. All responded that confidentiality was unnecessary, but where particularly sensitive issues are discussed the organisations have been kept anonymous by lack of specificity or use of a pseudonym (Agency A, Agency B etc.)

In total, it is estimated that 40 semi-structured interviews were undertaken with respondents from outside of the case study organisations (as listed in Appendix B) and 28 with staff working directly for the organisations. These have not been itemised for anonymity purposes, but all semi-structured interviews are summarised by respondent type in Table 2 below. The total number is given as an estimate because in some cases it was hard to decide the boundary between an extended informal conversation and a semi-structured interview. Because of the nature of the participant observation, I often asked interview-type questions during encounters that had not specifically been arranged as 'interviews'. Whenever I met DEEP entrepreneurs, for example, I asked them questions from a pre-determined list (provided in Appendix C) even though it was not possible to arrange more formal interviews with them. Even where an interview had purposely been arranged, the setting available to hold it in often determined the level of formality. Some were conducted during a Malawian trade fair next to the responding organisation's stand, for example, whereas the majority were carried out at organisations' own offices. The lengths of interviews varied from as short as half an hour in a couple of cases where an unforeseen interruption cut it short, to up to three hours or more. It often took longer when there was more than one respondent.

Semi-structured, open-ended interviews give some level of consistency between interviews in order to obtain comparable data, but at the same time still allow each interview to develop over its course (Wisker, 2001). The specific questions were formulated during the fieldwork period once the programme context had become familiar and varied according to the organisation or interviewee type. Examples of the core questions asked for some of the main types are given in Appendix C. Transcripts have not been provided for anonymity reasons.

4.4 Data analysis

All semi-structured interviews and key informal conversations are shown in Table 2. Where relevant the data was in some cases summarised into Excel spreadsheets in order to analyse further and generate basic quantitative data, such as the number of times similar key phrases or responses were mentioned. However, since this data was based on limited, convenience samples it is acknowledged that it is not necessarily representative, but simply attempts to illustrate some of the general trends amongst those I talked to.

For the ethnographic data a 'spiralling' process (Silverman, 2005) was used to draw out common themes and start to respond to the set research questions. Spiralling involves repeatedly reviewing the collected data, initially to draw out more general observations but leading to increasingly specific ones with each iterative analysis. This included coding activities where particular themes were highlighted and data organised into those different themes. It was found that this was easier to do manually rather than using qualitative analysis software.

The particular vantage point offered by the positioning of the participant observation inevitably led to a bounded primary data set. The coding and spiralling approach used for data analysis then led to key themes developing that were carried forward as the main findings presented in the following empirical chapters. This resulted in specific components of the market assemblages being singled out for detailed exploration, such as particular 'market devices' and specific types of market actor. The selection of these was therefore a product of the research methodology that was applied, rather than determined by deliberate pre-selection. The number of aspects focused on was also restricted by the necessity to rationalise the scope of analysis within the thesis. It is acknowledged, however, that there are numerous other important features of these markets that could merit from further research; several examples are identified within the concluding chapter.

Table 2: Key respondents engaged with during research

Respondent type	Relevant case study	Engagement type	Number of respondents
DEEP management	GVEP	Semi-structured interviews	7
DEEP business mentors	GVEP	Semi-structured interviews	8
DEEP technical mentors	GVEP	Semi-structured interviews	1
DEEP entrepreneurs	GVEP	Informal conversation	30 (groups counted as 1)
SolarAid management	SolarAid	Semi-structured interviews	4
SolarAid staff	SolarAid	Semi-structured interviews	8
SunnyMoney entrepreneurs	SolarAid	Informal conversation	4
SunnyMoney corporate customers	SolarAid	Semi-structured interviews	3
SunnyMoney non-corporate customers[4]	SolarAid	Informal conversation	Health clinics – 5 Schools – 6 Individuals – 15
Kerosene / kerosene lantern suppliers	SolarAid	Informal conversation	2
Market traders in Karonga, northern Malawi	SolarAid	Trader survey	47
School children	SolarAid	Homework study	116 in 2 schools
Solar manufacturer / assembler / distributor (excl. SunnyMoney & DEEP entrepreneurs)	Both	Semi-structured interviews	15
Cookstove manufacturer / assembler / distributor (excl. DEEP entrepreneurs)	GVEP	Semi-structured interviews	4
Briquette manufacturer / assembler / distributor (excl. DEEP entrepreneurs)	GVEP	Semi-structured interviews	3
Development intermediary involved with clean energy products generally (excl. case studies)	Both	Semi-structured interviews	5
Carbon finance organisations	Both	Semi-structured interviews	7
Government agency	Both	Semi-structured interviews	Kenya – 1

[4] Because of the differing levels of formality, the encounters with corporate customers have been classified as semi-structured interviews, whereas the encounters with other bulk customers (e.g. schools, health centres, hospitals) have been classed as informal conversations.

			Malawi – 2

4.5 Reflexivity

Reflexivity is a particularly important concept when using ethnographic methods (Fife, 2005). The researcher reflects on how their own actions during the research period and their broader background (e.g. education, nationality, ethnicity, previous work or research experiences) may have affected both the research findings and the analysis of those findings. This fits with O'Reilly's (2005) definition of ethnography given above that states that ethnographic work must acknowledge the researcher's own role. In fact, the researcher is such an inherent part of ethnographic research that they are often described as the 'research instrument' (ibid.). Ensuring reflexivity in the associated written work also allows others to take this into account when applying the lessons learnt or using the study for secondary analysis.

Reflexivity related to personal subjectivity

Although I tried to make the fieldnotes as objective as possible, the data collected is inevitably my own account of events that occurred. Furthermore, this effect is likely to have escalated when interpreting the observations during data analysis. As described by Wisker (2001) (p.178): "Your previous experience of observation and of observing something similar will affect how you 'read' situations and behaviours…"

Fife (2005) describes reflexivity as the personal and professional position of the researcher and how this may have affected the research, analysis and conclusions. He suggests that good practice is to ensure your own awareness of any possible bias you may have and then to make the reader of the subsequent written work also aware of it, but without distracting too much from the main focus of the work. As DeWalt and DeWalt (2002) (p.94) describe: "We need to be aware of who we are, understand our biases as much as we can, and understand and interpret our interactions with the people we study." In their ethnography of development organisations, Crewe and Harrison (1998) (p.19) also clearly advocate reflexivity: "Many would agree that it can be important to contextualise observations within one's own personal and social history. While the novelist should leave much to the imagination of the reader, the ethnographer should leave as little as possible to guesswork."

Reflexivity related to organisational positioning

Another key aspect of reflexivity here is how involvement with an organisation influences an ethnographic account of that organisation. Although I theoretically acted as an independent researcher, I assumed active roles within the case study organisations and was therefore most likely seen as part of their 'machinery' by those associated with or affected by the programmes.

David Mosse is one of the most extensively written sources on the relative benefits and disadvantages of undertaking anthropology from different positions within or without development-related organisations. He discusses, for example, the trade off between being an employee and enjoying access to internal workings of an organisation, versus having no constraint to your analysis when not under an organisation's command or possible retribution (Mosse, 2001).

Mosse's work has helped highlight both how fieldwork relations shape writing, and how writing now alters relationships of the field. Mosse (2006) describes the controversy created by his book *Cultivating Development* that gives a detailed and often critical ethnographic account of his multi-sited work in the development field, mainly focussing on a DFID-funded agricultural project in western India. He circulated the manuscript for comments prior to the book's publication and received many strong objections, including from previous colleagues who objected: "on the grounds that the book was unfair, biased, contained statements that were defamatory and would seriously damage the professional reputation of individuals and institutions, and would harm work among poor tribals in India" (ibid., p.935). He ultimately published the book without any significant amendments, however, because of it being a 'true ethnographic account', in the literal sense of the word, that made him feel morally obliged to publish it so that lessons could be learnt (Mosse, 2005). A side-effect was that it negatively impacted some of his relationships with former employers, colleagues and friends, and moreover may have affected the ability of other researchers to gain access to undertake similar work.

Practical application of reflexivity

The following discussion is an attempt to apply the lessons learnt above to this work, framed as responses to two key questions.

To what extent did my presence as a female British university researcher affect how the work of the organisations was portrayed to me?

It is impossible to know definitively, but it did not appear that any of the organisation staff were consciously changing their normal practices because of my presence as a researcher. My particular research aims were relatively loosely defined and I was kept busy with the activities I was undertaking on behalf of the organisations; it therefore felt like I was seen primarily as an intern or volunteer. Both organisations had hosted such roles on numerous occasions previously so this seemed to help avoid colleagues feeling that I was there to scrutinise their work, something I had been concerned about in advance. The organisations also employed female graduates as permanent staff, so I have no reason to think I experienced any unusual moderation of behaviour on that account.

What did clearly impact the work of the organisations was what I chose to do myself. I was undertaking activities that were part of the organisations' overall work programmes: this is an inevitable and in fact essential feature of participant observation. How I chose to carry out tasks and the impression I gave of the organisations in doing them would become part of what I was analysing, if not at a detailed level then at least by the contribution made to their overall work and its perception by others. I would like to think that I was able to keep this in mind when observing because I felt I could generally separate what was happening anyway with the particular activities that I was organising or influencing, especially in the early stages of the research. However, I was a very active participant in some activities that later became particular features within the analysis. I hope that I have given an honest account of my integral part in making those activities happen where applicable. My own feelings as an 'NGO worker' rather than as a researcher also, I feel, helped enrich some of the analysis.

Being an 'outsider' in the countries I was based in must have also had various impacts, not because of being a researcher but because of being a British 'mzungu' (Swahili for 'white person'). It often seemed that for the staff I represented an association with senior management back in the UK or at the regional headquarters, less so for GVEP in Nairobi where there was already a greater presence of other Europeans and high-level managers, but certainly for the GVEP Kampala office and in Mzuzu for SolarAid. Things I was told by colleagues were sometimes geared around me being able to take a message back to 'management' in the Nairobi or UK offices and initiate changes as a result. I ended up feeling quite guilty that this was unlikely to be the case, at least certainly not in a direct fashion. Additionally, it is inevitable that some information might have been withheld or activities restricted in my presence, even if not overtly or consciously, on the same basis.

For the entrepreneurs and customers I spoke with, it would have been hard for them to separate me from the organisations I was there with. My role as an 'independent researcher' would most likely have been an unknown and certainly an irrelevant distinction, even if the interviewees were nominally told about it as part of the informed consent process. Again, information I received from them often felt shaped towards me being perceived as a communication tool to get feedback into the organisations. I would hear complaints about high prices or lack of larger systems for solar lantern customers, or frustrations with promised loans not coming to fruition for GVEP entrepreneurs. This will certainly have had a knock-on impact on the overall shape of the information set I was receiving. The other key impact of my background was my inability to speak any local languages and therefore reliance on staff from the organisations acting as translators.

To what extent did my subsequent attachment to the organisations impact my ability to analyse their work objectively?

I am aware that by the end of both research phases I felt part of the organisations and may have become more inclined to interpret and present their work positively to others. This was in part because of the gratitude I felt for having been allowed to undertake the research with them at all, and more significantly due to the continued support and openness that all of the staff showed me during my time there, with many of them becoming good friends. I was lucky, however, that in all honestly I was mostly impressed with the integrity of both organisations and their staff. There were often things that did not work out as planned, could have been done better or at least tried in different ways, or prioritisations given to things that seemed less important and other areas neglected, but there were never instances where I felt shocked or appalled by the approaches taken.

Furthermore, both organisations asserted willingness to receive feedback regarding any constructive findings, positive and negative. They made it clear that they wanted to learn from hosting me as a researcher and expressed willingness for transparency and non-anonymity; therefore I have not felt restricted in instances where the analysis *has* been critical of aspects of their work. All critique was made on the basis of evidence collected and fully explained in both the thesis and with the organisations directly where appropriate.

The openness aimed for at all levels within the organisations was seen in various ways. Managers at GVEP, for example, were honest about where financial irregularities had been uncovered during the early stages of the project. They had

taken action to resolve it and keep the donors informed of the situation and its quick resolution. The strong talk on tight financial control and the expectations made of individual staff given by the Financial Director at the Naivasha workshop was not for my benefit to give a squeaky clean impression of the organisation, but a clear part of trying to disseminate their stated ethos of rigorous transparency. Staff at SolarAid in Mzuzu were seen to work incredibly hard at times, particularly given limited pay for the non-permanent staff, yet equally were able to relax and enjoy themselves at other times, in the same way that staff from any office might do. For both organisations everything appeared to be done with the motivation of good intentions, alongside the degree of self-interest that is inevitable in everybody, not least myself. I do not think that people working in the field of 'development' should be expected to behave altruistically.

Mosse (2005, 2006) discusses how he felt he had to be true to himself as an ethnographer despite knowing he was creating intense friction with prior colleagues and friends. Admittedly it was a relief to find that no huge exposés seemed necessary here. I hope, however, that I have given an honest account of the case studies observed. The aim is to at least remove the gloss that is so often spread across the websites and marketing material of development intermediaries, and indeed every organisation – all must market themselves to their stakeholders in order to perpetuate their existence. I also hope that my time with the organisations and the output from it will be seen by their staff as useful and fairly portrayed, and that it does not jeopardise their willingness (or that of other development intermediaries) to host further researchers on a similar basis.

4.6 Ethical issues

A basic self-assessment of ethical risks was carried out as per the research ethics policy of the School of Social and Political Science at the University of Edinburgh. The research was made overt where possible, in that those clearly involved or affected by it were informed of its existence and purposes and asked to verbally give their informed consent. It is recognised, however, that achieving this was compromised by various factors, including difficulties in identifying those involved or affected in the first instance, and more generally the practicalities of describing my research to numerous people daily with whom I did not share a common language. Again, my colleagues within the organisations kindly helped with this.

Due to these difficulties, the default approach in writing up this thesis has been to give anonymity to most individuals mentioned in the research. The exceptions have

been the DEEP and SunnyMoney entrepreneurs who expressed consent to be named. This is in order to be able to identify the same people in case further research might be possible in future. Anonymity of whole organisations was discussed with the relevant entities. In preliminary discussions the two case study organisations stated that they did not require confidentiality due to their transparency policies, but before submitting this thesis I sent them a summary of its main findings in order to check their continued willingness for non-anonymity.

The reviewers (both managers from the organisations' London HQs) commented that they felt the thesis to be a fair portrayal and in general agreed with the findings made. Their specific feedback led to some details being changed in order to improve accuracy and take confidentiality into account where this might have been jeopardised. One did question a particular part of the analysis that they felt came across as too accusatory and suggestive of dishonourable intentions. Since this had not been the aim of my writing, I amended the section in terms of the way it was written but so that the originally intended point was still made. I do not feel that this compromised the analysis in any way.

Communication and transparency has been key for maintaining a good working relationship between me as an independent researcher and the development intermediaries as research subjects. For any subsequent articles for publication, anonymity or otherwise will be determined on a case-by-case basis.

4.7 Limitations

The limitations of the research design have been integrated in the discussion above and will be mitigated as far as possible with the measures identified, such as incorporating reflexivity. An extended discussion of the limitations and boundaries of the overall research is provided within the conclusions in Chapter 0.

5 Case study overviews

The first development intermediary that I undertook research with was the British non-governmental organisation (NGO) Global Village Energy Partnership (GVEP) International; the programme focused on was their Developing Energy Enterprises Project (DEEP). Participant observation was carried out in Kenya and Uganda over five months between October 2011 and February 2012.

A second research phase was undertaken in Malawi over five months between March and August 2012. The organisation was again a British NGO, SolarAid; its new social enterprise 'SunnyMoney' that imports and sells pico-solar products was the specific focus of the research.

This chapter provides a detailed overview of the case study organisations and their activities. It also describes the contexts within which the development intermediaries were working and my research was carried out. Through the discussion and presentation of four market maps (three for GVEP, one for SolarAid), the first research question is addressed:

> What marketisation activities are the case study development intermediaries undertaking?

5.1 Case study 1: GVEP International's Developing Energy Enterprises Project (DEEP) in Kenya and Uganda

On 7th October 2011 I arrived at Nairobi airport and in a taxi negotiated the city's infamous traffic to reach the neighbourhood of Kilimani, directly west of downtown. Sitting in the traffic I saw many large white four-wheel-drive vehicles, generally Toyotas, with various names of international NGOs written across the sides. It provided a clear reminder that Nairobi is the capital of development industry activities in eastern Africa, hosting the regional headquarters of many organisations including the United Nations (and various of its individual agencies such as UNEP and UN-Habitat), international NGOs such as Human Rights Watch and Oxfam, and countless regional and country-specific development related organisations. I was there to start my fieldwork with the British charity Global Village Energy Partnership (GVEP) International, which likewise has its Africa Regional Office in Nairobi.

GVEP is registered as a charity but it has a specifically business-based approach, working across Africa and the Caribbean with all of their programmes involving support of start-up or existing micro, small and medium-sized businesses that provide clean energy products and services in rural and peri-urban areas. From the moment I landed at Nairobi airport, businesses of a whole range of sizes could be seen everywhere: all of the services you would expect at the airport were present and being frequented, and the main highway into the city was unsurprisingly lined with kiosks, shops and offices. Even the vast amounts of produce arriving in trucks at the airport and being flown out in cargo planes and the holds of passenger flights illustrated Kenya's strong export markets for coffee, tea and horticulture (flowers, fruit and vegetables). After being in the country a few days, these industries also became visible in trips beyond Nairobi. My first excursion with GVEP was to a training workshop on the shores of Lake Naivasha around two hours west of the capital, with the chartered bus taking us past rows and rows of large white polytunnels. My new colleagues explained that they were full of Kenya's famous roses, mostly destined ultimately for the European cut flower markets that supplies stores such as Marks and Spencer.

Existing business services specifically targeting small and medium-sized enterprises were also evident: large billboards on the roadside advertising "Diamond Bank – the best bank for SME lending" were just one example. Any concerns I had arrived with (as part of my readiness to extend critiques of the notion of 'development') that a small British NGO might be helping to 'import capitalism' into Kenya could be dismissed – simply looking around made it clear that trading systems had been present a long time.

After an insightful introduction into the world of a development intermediary in Kenya, two months later, in December 2011, I left the country temporarily to spend two months at GVEP's smaller Ugandan office in Kampala. Like Nairobi, I found a thriving city with many signs of a rapidly growing business environment, such as numerous large hi-tech office premises under construction. Kampala's infamous extensive bustling markets, particularly for food and second hand clothing, were another reminder of the well-established presence of markets in the country, in this case in the very physical sense. Uganda's main source of foreign exchange is coffee exports (Uganda Bureau of Statistics, 2012), with the country being the eleventh largest coffee producer and exporter in the world and second largest in Africa (second to Ethiopia) (International Coffee Organization, 2013). It therefore felt apt

that GVEP's office was located in the administrative building of the Uganda Coffee Development Authority.

Although the GVEP offices are based in the two capital cities that have just over 6% of the countries' populations living in each (Kenya National Bureau of Statistics, 2010, Uganda Bureau of Statistics, 2012), I also spent a significant amount of the research time in peri-urban and rural areas while shadowing GVEP's staff and meeting the 'entrepreneurs' they were supporting. I was particularly struck by the similarities between areas of rural Kenya and rural Uganda; a large part of my experience was in western Kenya (around Kisumu) and in eastern Uganda (around Jinja), which are neighbouring regions of similar topography. In fact, Kisumu and Naivasha province were originally included within the British protectorate of Uganda until they were transferred to Kenya in 1902 (Hornsby, 2012). The two countries also had various commonalities in ethnic history, including a predominance of Bantu-speaking people and a later arrival of Nilotic people such as the Luo (ibid.), although there were still considerable differences in the two countries' overall histories.

I observed much greater diversity within each country, particularly between western Kenya and the coastal region around Mombasa (Photo 1), another area that featured heavily in my fieldwork. This is probably unsurprising since once its borders were finalised, Kenya had became home to one of the most varied landscapes of any African country, including five different types of climatic zone, and populated by five distinct ethnic groups and over 40 smaller communities (ibid.)

Photo 1[5]: Photos of rural areas around Kisumu (left) and Mombasa (right) in Kenya, illustrating differences in topography and vegetation

[5] All photos used in this thesis were taken by the author, except where a source is specifically cited.

For this reason the presentation of my analysis of GVEP's work in Kenya and Uganda has not been separated along national boundaries. Instead, examples from different areas within the two countries have been used as applicable and the impact of national context highlighted where necessary. The overall country contexts within which my fieldwork was undertaken is also further described below in order to set the scene.

5.2 Kenya

When I arrived in Kenya the predominant issue in the domestic media was the increasing security concern relating to Kenya's border with Somalia. Several tourists and foreign humanitarian aid workers had recently been kidnapped from Kenyan territory by suspected Somali pirates and/or militants, with a knock-on impact on the tourist industry. A few weeks after I arrived, the Kenyan government declared war on the Islamist militant group al-Shabaab and sent troops into neighbouring Somalia. Grenade attacks in Nairobi followed a week later with a similar attack in Mombasa in January 2012.

The second major news story was the concern over whether the next general election, at that time planned for August and then December 2012 but later postponed until March 2013, would lead to civil violence again; the previous elections at the end of December 2007 had led to tribal clashes and over 1100 deaths (Hornsby, 2012). The current leaders of Kenya were Mwai Kibaki (Party of National Unity) as President and Raila Odinga (Orange Democratic Movement) as Prime Minister. These men originated from the two largest ethnic groups in Kenya: the Kikuyu and Luo tribes respectively, a factor at the heart of the post-election issues.

Having been brought under British administration in 1895 when the East Africa Protectorate was established, Kenya gained independence in 1963 with a population of 8.6 million under the presidency of Jomo Kenyatta (Photo 2). It has retained a capitalist stance since and economically is seen as one of the relative successes of post-colonial Africa, having a rising middles class and strong performance in its predominantly privatised industries (Hornsby, 2012). By 2012 the population was estimated at 43 million (World Bank, 2013).

Photo 2: View of central Nairobi (left); statue of Jomo Kenyatta (right), October 2011

Going beyond its apparent economic success, in 2012 Kenya ranked 145th in the UNDP's Human Development Index with a score of 0.519, out of a total of 186 countries in the index. The scores are out of a possible maximum of 1 and based on four indicators in three areas: life expectancy at birth to indicate health; mean years of schooling for adults and expected years of schooling for children, to indicate education, and; gross national income per capita, to indicate living standards (UNDP, 2013b). Of course this is just one indicator and is limited by the quality of data available (Jerven, 2013). It takes into account the non-economic issues of health and education, but can still be maligned for taking an income-based indicator as a proxy for living standards. It is widely acknowledged that while per capita GDP has risen in Kenya, disparity has grown between rich and poor and much of this is based on urban/rural divisions (although there has also been significant and swift growth in the number of urban poor, particularly youth) (Hornsby, 2012). Overall, however, Figure 15 shows that nearly 79% of Kenyan urban residents are in the highest wealth quintile, whilst just 6% of rural residents are. Conversely, only 0.5% of urban Kenyans are in the lowest wealth quintile, as opposed to 25% of rural dwellers.

Figure 15: Wealth quintiles in Kenya (Kenya National Bureau of Statistics, 2010)

Percent distribution of the de jure population by wealth quintiles, according to residence and region, Kenya 2008-09

Residence/region	Wealth quintile					Total	Number of population
	Lowest	Second	Middle	Fourth	Highest		
Residence							
Urban	0.5	1.5	2.7	16.8	78.5	100.0	7,365
Rural	24.7	24.4	24.2	20.7	6.0	100.0	30,704
Province							
Nairobi	0.0	0.0	0.2	4.2	95.5	100.0	2,352
Central	2.2	11.1	29.2	36.0	21.4	100.0	3,870
Coast	26.3	12.4	9.4	16.2	35.7	100.0	2,953
Eastern	16.7	22.3	27.6	26.3	7.1	100.0	6,629
Nyanza	17.6	28.4	23.9	17.7	12.3	100.0	6,324
Rift Valley	28.2	19.2	16.1	17.8	18.7	100.0	10,375
Western	17.9	33.0	25.1	18.8	5.2	100.0	4,506
North Eastern	75.9	5.6	5.5	4.9	8.0	100.0	1,059
Total	20.0	20.0	20.0	19.9	20.1	100.0	38,069

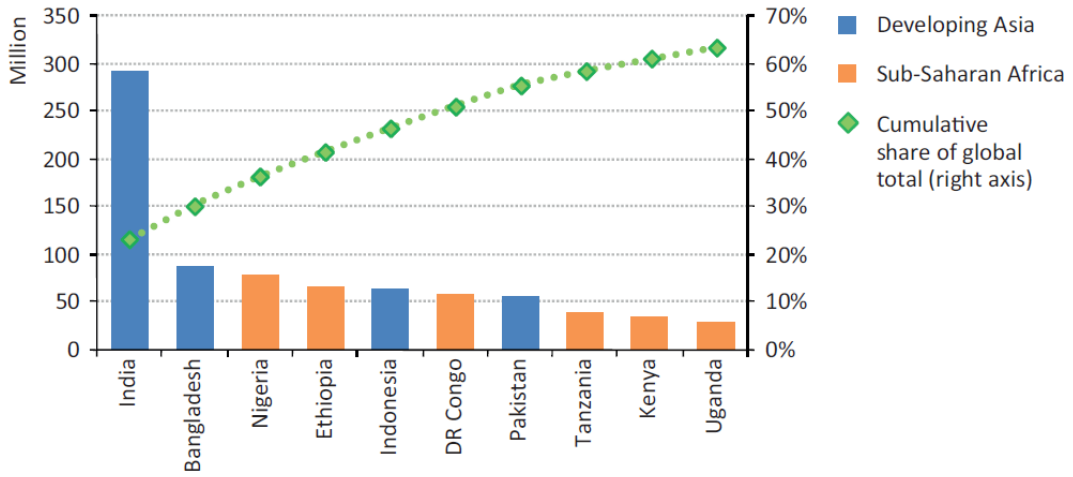
This wealth variation manifests itself in various ways, such as the relative building materials of houses: brick and concrete are the used in the majority of urban dwellings, and traditional constructions using wood and mud or dung are prevalent in rural areas. The country's most recent Demographic and Health Survey, undertaken in 2008 to 2009, showed that just over 50% of both men and women living in rural areas who had been employed in the last 12 months worked in agriculture. Much of this was declared as 'self-employed' work or 'employment by a family member', indicating subsistence farming. By contrast, professional, technical or managerial work was the most common in urban areas (Kenya National Bureau of Statistics, 2010).

As well as its exports in agricultural products, Kenya also has one of the strongest manufacturing sectors in the region and manufacturing contributed 11% of Kenya's GDP in 2008 (ibid.) In terms of renewable energy, Kenya is a leader in manufacturing: the region's first solar photovoltaic assembly facility was due to open in Naivasha shortly after I arrived in the country. The government is supportive of renewable energy installations, offering a feed-in-tariff for renewable electricity – another first in the region. All of the Kenyans I met who I talked with about GVEP and its focus on renewable energy were familiar with solar power, often commenting on their own or neighbours' experience of it.

Kenya has various rural electrification programmes established and governed by the Rural Electrification Authority, mainly focusing on providing electricity access to public facilities such as trading centres, health clinics and schools identified under its Rural Electrification Master Plan published in 2009 (Rural Electrification

Authority, 2013). The 2008/2009 Demographic and Health Survey (Kenya National Bureau of Statistics, 2010) found that 23% of Kenyan households had electricity connections, an increase from 16% at the time of the previous survey in 2003. However, whilst 66% of urban households were seen to have electricity access, the figure was only 8% for households in rural areas. Both Kenya and Uganda have featured within the top 10 countries worldwide in terms of absolute number of people without electricity access, as shown in Figure 16.

Figure 16: Countries with the largest population without access to electricity, 2010 (OECD and IEA, 2012)



For cooking, 84% of Kenyan households use solid fuel (often referred to as traditional biomass), including coal, charcoal, wood, straw, shrubs and agricultural residues. This number increases to 97% in rural areas, where 83% use firewood. In urban areas, the most prevalent solid fuel is charcoal, used by 41% of households (Kenya National Bureau of Statistics, 2010).

5.3 Uganda

In 2012 Uganda reached a population of just over 36 million (World Bank, 2013). It ranked 161st in the Human Development Index, joint with Haiti, both scoring 0.456 (UNDP, 2013b). Politically, at the time of my arrival Uganda was known for having one of the longest serving presidents in Africa, Yoweri Museveni of the National Resistance Movement. He has been in power since 1986, enabled by his party's abolition of presidential term limits. With allegations of foul practice during the previous election in 2011 there had also been some associated civil unrest. It thankfully resulted in significantly fewer casualties than the Kenyan violence, but once again elections were a hot topic in the press. Uganda gained independence

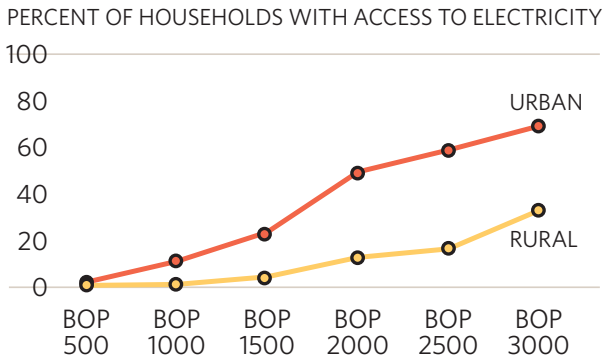
from Great Britain in 1962 and suffered a turbulent political history, particularly through the renowned presidency of Idi Amin.

During my research in Uganda, energy issues were also a prevalent topic for the media, for a number of reasons. Firstly, significant oil resources had been identified in the country in preceding years and there were ongoing legal disputes over the issuance of contracts for their extraction, with accusations of related government corruption. There were also huge concerns over environmental implications as the reserves were partly located under the country's largest conservation area, Murchison Falls National Park. Secondly, at the start of 2012 the Ugandan government announced a reduction in electricity subsidies amounting to a 36% rise in bills for those with connections. Although it was naturally resulting in objections from many people who would be affected, others, such as ubiquitous political commentator Andrew Mwenda (2012), were arguing that the tariffs should be removed altogether due to the inequity of such large amounts of government funding being spent on subsidising a service available to very few Ugandans.

Energy access is a particularly pertinent issue in Uganda with one of Africa's lowest rates of household electricity access (Brew-Hammond, 2010). The last Demographic and Health Survey was conducted in 2011 and found that just 15% of Ugandan households had electricity connections overall, with this increasing to 55% in urban areas but reducing to 5% in rural areas. However, this had increased from 42% and less than 3% respectively at the time of the previous survey in 2006 (Uganda Bureau of Statistics, 2012).

Figure 17 shows the percentage of Ugandan 'bottom of the pyramid' (BOP) households with access to electricity in urban and rural areas. BOP500 denotes those with annual incomes below US$500 (in local purchasing power), BOP1000 is those between $500 and $1000, and so forth. The BOP characterisation is given an upper limit of $3,000 annual income. For the BOP500 and BOP1000 in rural areas of Uganda, Figure 17 shows that electricity access is close to zero percent.

Figure 17: Percentage of Ugandan households with access to electricity (Hammond et al., 2007)



According to census data, solid fuel is used for cooking by 96% of households, with rates of 98% in rural areas and 85% in urban areas. As for Kenya, wood was the main cooking fuel in rural areas (85%) and charcoal in urban areas (68%). Although the wealth disparities are not quite as marked as in Kenya, there is still only 2% of the urban population in the lowest wealth quintile while 75% are in the highest, compared to just 10.6% of rural dwellers being in the wealthiest quintile (Uganda Bureau of Statistics, 2012).

In both Kenya and Uganda, the typical cooking fire for rural areas is called a three-stone fire, built out of three stones or bricks (or piles of bricks as in Photo 3 below) to balance a cooking pot on. I saw these in use in many households, both indoors and outdoors, generally being fed by a very careful placement of consistently sized wood in order to minimize fuel consumption. For urban cooking the predominant method is a charcoal stove. These can either be built into brick and concrete kitchen units, or are more commonly small stand-alone stoves made locally out of sheet metal. Because of their lack of any insulating material they are known to have very low thermal efficiency. Cooking on inefficient stoves and open fires has also been linked to respiratory problems through smoke inhalation, particularly when cooking is carried out indoors, since cooking fires emit "primarily carbon monoxide and small particles, but also nitrogen oxides, benzene, butadiene, formaldehyde, polyaromatic hydrocarbons and many other health-damaging chemicals" (WHO (2006) p.8). Women and children can end up being exposed to the equivalent of smoking two packets of cigarettes per day (ibid.) Recent research suggests that smoke inhalation during cooking "is the fourth worst risk factor for disease in developing countries, and causes four million premature deaths per year – exceeding deaths attributable to malaria" (GACC (2013) citing the Global Burden of Disease study 2012) and is linked to tens of millions of cases of related illnesses.

Photo 3: Traditional three-stone wood fires for cooking in rural Uganda

5.4 GVEP International

It was in the context described above that I worked with GVEP's teams based in Nairobi and Kampala. The Nairobi office was in a fairly unassuming building in the leafy suburbs of Kilimani to the west of downtown, at the end of a quiet tarmac road before it turned into a brief section of dirt track. Although there was little traffic, it seemed to be along a common cut-through for people walking to work after alighting from matatus on the nearby and extremely busy Ngong Road. The office was on the second floor and after climbing the bright white tiled stairs you came across the small reception desk. Opposite it, a glass cabinet hinted at GVEP's core business, displaying various solar lights, 'improved' cookstoves, bags of and individual cooking fuel briquettes and some small bottles of different shades of nut and seed oils intended as biofuels. Most of the office was open plan with around ten staff in the main area, with a separate office for the Financial Director and his administrator and a similarly sized office smartly furnished for the overall Regional Director.

Contrary to suggestions from other analyses of international development organisations (e.g. Crewe and Harrison (1998), Carr et al. (1998)[6]) the majority of the staff working in the Nairobi and Kampala offices were national citizens. Although four expatriates (three British and one Swiss) were currently based in the Nairobi

[6] Carr et al. (1998) describe how in sub-Saharan Africa a quarter of overseas development assistance was being spent on technical assistance, with a large proportion of it being on 'expatriate' aid – at an average annual cost of US$300,000 to fund just one expatriate.

office working on other projects, they only represented around 20% of the total employees and none were in senior management roles. They were not working on the particular programme (DEEP) that I was there to research.

In both the Nairobi and Kampala offices most people spoke proficient English, with English being the official language of communication. However, Swahili and Luganda were also spoken more informally between staff, and often those originating from the same areas used their local languages (e.g. Kikuyu and Luo in Kenya), provided that everyone participating in the conversation was conversant in it. Since I always undertook field visits with one or more members of GVEP staff, they kindly acted as my interpreters if they engaged in local dialect or Swahili / Luganda with the people we were visiting. The methodological reasoning for this has already been discussed in Chapter 0.

GVEP International was first officially established at the 2002 World Summit for Sustainable Development in Johannesburg as a partnership between the World Bank, UNDP and a large number of other development actors. GVEP started off as a trust fund under the auspices of the World Bank with a main role of promoting policy debates around energy access, and providing donor funds for related programmes. It was governed by a Partnership Board representing a wide array of stakeholders. In 2006, however, the partners decided to establish GVEP as a separate NGO. The UK's Department for International Development (DFID) pledged core funding for 5 years and GVEP the charity was registered in the UK with an independent board of trustees. It began with a global remit for its programmes but the charity subsequently became focused on sub-Saharan Africa and the Caribbean, employing around 85 staff across the London headquarters and its various country offices.

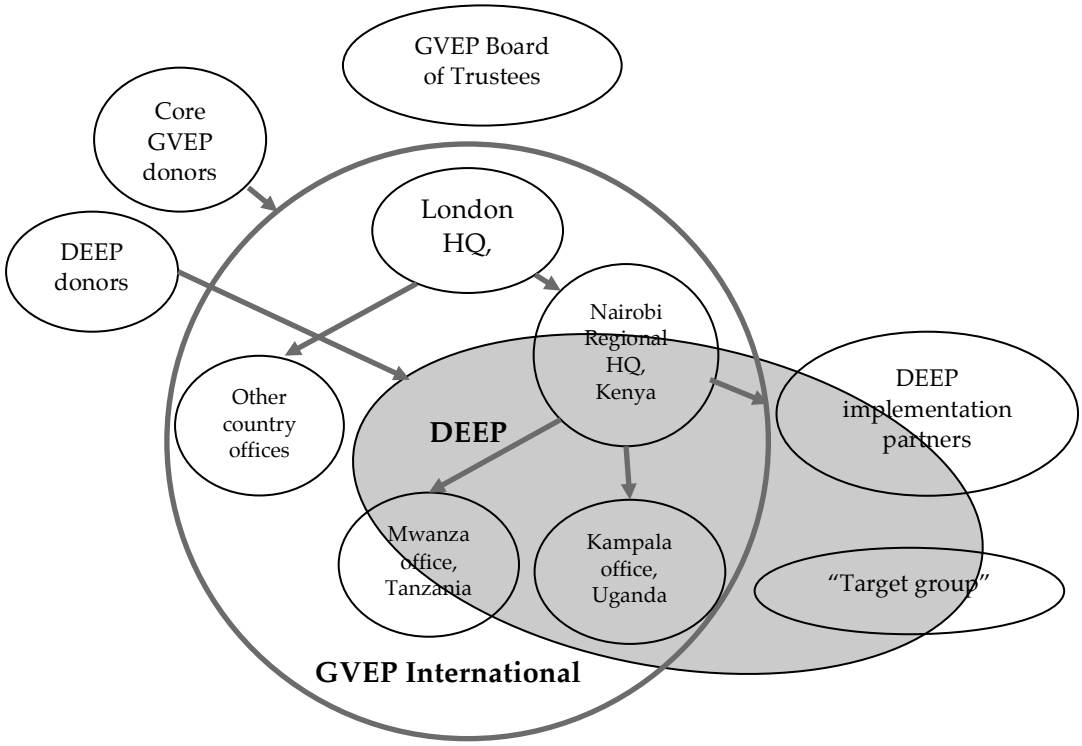
In 2012, GVEP's annual report indicated that its specific operations were now funded by a wide range of donors, with grant income totalling around £3.15 million in the financial year 2011/2012 (GVEP International, 2012a). From the outset of my research, it was clear that finances were extremely tightly controlled, both for operational and overhead costs. The in-office Financial Director was a strong character with very clear rules on issues such as reclaiming expenses, offering a system that had evidently been thoroughly scrutinised for any loopholes. Transparency International's Corruption Perceptions Index 2012 puts Kenya and Uganda 139th and 130th out of 176 countries respectively, with scores of 27 and 29 out of a possible 100. These scores are based on perceptions of public sector corruption levels elucidated from a range of independent surveys (Transparency International,

2012). Both within the offices and more widely amongst people and in the national media, corruption cases or speculations of corruption were frequent topics of conversation.

GVEP had previously been subject to one severe case where an individual managed to establish a system to illicitly transfer money out of GVEP accounts. Before it was uncovered, the motivation of other staff was seriously being affected as they suspected that something was awry but could not establish exactly what. When the discovery was made, the individual was dismissed. The financial managers undertook a complete audit of the project and GVEP as an organisation and invoked the much-tightened controls now apparent. The money was repaid and the issue was fully aired to the donors who were satisfied with how it had been followed up and with the new conservative measures put in place. Ultimately, the experience appeared to have led to some valuable lessons being learnt and improved operational procedures as a result, giving the staff confidence in the organisation's management.

Figure 18 shows a schematic of the operational structure of GVEP International and how it relates to the funding and financial management of DEEP. It highlights its hierarchical structure from the headquarters in London, through to the East Africa regional office in Nairobi and field offices in Mwanza and Kampala. While the Kampala office was engaged only in DEEP related activities, the other offices were all also hosting other project activities.

Figure 18: Schematic of GVEP and DEEP operational structure (Source: Author)



5.5 DEEP East Africa

GVEP has a number of different projects operational at a time, always focussed on promoting local sustainable energy businesses through initiatives ranging from business plan competitions and providing financial linkages, to more comprehensive support of the type provided by the Developing Energy Enterprises Project (DEEP) East Africa - the focus of this case study. DEEP involved the recruitment of new and existing energy 'entrepreneurs' in Kenya, Uganda and Tanzania. They then received training, one-to-one mentoring, marketing and networking support, and linking to financial institutions in order to help them build up their businesses and reach more consumers.

DEEP was the first project to be launched by the newly independent GVEP International and one of the managers described it as GVEP's 'biggest and most important programme in East Africa'. Project documentation shows that it is financed with €4 million of donor contributions: €2 million each from the European Union (under its African, Caribbean and Pacific Energy Facility) and the Dutch government (GVEP International, 2006).

Although DEEP was conceived as an idea prior to GVEP becoming independent in 2006, the length of time to develop an application, secure funding and launch the programme meant that DEEP officially started on 1st March 2008. It had an expected duration of 5 years, with donor reporting requirements splitting the project into 20 quarter-years. The research for this thesis was carried out during the 15th and 16th quarters of the project, after the project had been in operation for 3 and a half years. By the end of the research period there was just over a year left to go.

Photo 4: DEEP poster

My induction into DEEP was fortuitous since the start of my research period coincided with an internal workshop for all DEEP staff from across the three East Africa offices of GVEP (and implementing partners IT Power). It was held at the end of October 2011 near Naivasha in Kenya and was the first workshop that included the entire key and associated DEEP staff, rather than just the management level. GVEP's operations manager explained that it was to allow the different country staff to meet each other and develop a shared understanding of and motivation for the project. The workshop ultimately appeared successful in this regard. It was also a useful opportunity for me to learn in-depth about DEEP and meet the majority of staff involved (Photo 4).

Photo 4: DEEP staff at the regional workshop in Kenya, October 2011

DEEP funding

Most DEEP funding came from its donors – the EU and the Dutch government – but in reality their funding package could not be entirely separated from core funding for GVEP operations such as day-to-day office functions. Until the end of 2012 (when their core funding agreement expired) these funds came primarily from DFID; to a lesser but ongoing extent they also came from non-tied charitable donations (GVEP International, 2013a, GVEP International, 2012a).

Core funders for GVEP appeared to have limited influence on specific programmes. The detailed role of the DEEP donors in formulating its preliminary design and operational activities was difficult to elucidate fully during the research due to the time since project inception and lack of opportunities to engage with the donors or observe interactions with them. The original DEEP proposal was written in response to a request for proposals from the EU's Energy Facility and had to gain the approval of both donor bodies. However, a GVEP senior manager stated that beyond this: "The donors don't tend to get very involved. GVEP's quite transparent in quarterly reports – if something isn't working we say that and what we're doing about it. The EU wouldn't intervene unless there were clearly big problems and nothing being done to sort it out."

Senior managers did mention the Dutch government's influence on the technologies focussed on under DEEP. Biogas, for example, was excluded at their request due to their heavy focus on it under other initiatives. It was observed that several small biogas enterprises were being supported in Uganda under DEEP, however, so it was unclear whether their power was usurped or they had more recently rescinded this specific restriction. Some entrepreneurs involved in fossil-based energy activities such as kerosene and charcoal supply or charging batteries from the main electricity grid these activities were initially recruited for DEEP with the intention of helping them to diversify into more sustainable energy sources, but again at the Dutch government's specific request (based on concerns over supporting non-renewable energy) they had to be excluded from the programme.

DEEP partners

The initial plan was for DEEP to be run by a consortium of organisations led by GVEP in order to bring together a wider range of technical and geographical expertise, providing: "essential enabling capacity in energy sector expertise, community mobilisation and business management." (GVEP International, 2006). Seven different organisations were therefore involved in the first phase of recruiting

enterprises and entrepreneurs, but by the time of this research the international consultancy IT Power was the only remaining partner. DEEP managers said that the logistical difficulties of co-ordinating so many different organisations had ultimately outweighed the benefits of diverse expertise once the programme was operational. However, some institutional memory of the former partners' work was retained as several staff from these organisations subsequently became GVEP employees.

During the operational phase, GVEP was responsible for overall project management, business training and mentoring, and linking with financial institutions, while IT Power was responsible for energy technology training and ongoing technical support. IT Power is similar to GVEP in that it is headquartered in the UK with smaller international offices. However it is a private technical consultancy rather than a charity. Since IT Power did not have a management role in DEEP there is limited further discussion of the company here.

DEEP targets

The main project document for DEEP is the application form written in 2006 for EU funding and this describes the aspirational design of the project. It describes the 'target group' and 'final beneficiaries' of DEEP as shown in Figure 19.

Figure 19: Target group and final beneficiaries of DEEP as set out in donor application form (GVEP International, 2006)

	Network, Coastal Rural Support Project Kenya
Target group(s)	**1800 micro and small enterprises (MSEs)** started-up, diversifying into providing energy services or improving and expanding existing energy services in rural and peri-urban areas with the assistance of the project. **300 business mentors** trained, qualified and employed in the project **12,000 rural and peri-urban community members** with raised awareness of modern energy products, services and market opportunities
Final beneficiaries	**1,800,000 men, women and children** in rural and peri-urban areas accessing energy products and services from supported energy enterprises **1,300 households** receiving income from employment in supported energy enterprises **1,300 households** receiving income from employment in enterprises enabled by energy services provided by supported energy enterprises
Estimated results	**Increased awareness of modern energy** as a service which can be

By the end of December 2011, in the middle of the research period for this thesis, the quarterly donor report (GVEP International, 2012b) stated that a total of 772 enterprises (both individuals and groups of entrepreneurs) were being supported under DEEP. In fact, staff noted that around 1400 businesses had received initial training by that point, but the current number was significantly lower than the original target (1800) due to some having to be dropped (such as the 'non-renewable'

enterprises described above) and some choosing to leave (for example, on realising that grants would not be provided). Despite the lower figures, these 772 DEEP enterprises had collectively sold over 616,000 clean energy products in the preceding three months, a 25% increase on the previous three-month period. It brought the total estimated number of beneficiaries to over 1.18 million people for the programme thus far. Since this was around two thirds of the 1.8 million target at a point three quarters of the way through the programme timeframe, the managers were generally satisfied that DEEP was on track.

DEEP enterprises and entrepreneurs

The initial recruitment of entrepreneurs into DEEP was carried out by GVEP and its original partners, often utilising their existing networks. The process is described in Chapter 0. During the research period, recruitment for DEEP entrepreneurs was still continuing due to the shortfall in supported enterprises compared to the target number. An overall strategy change for DEEP halfway through the project led to GVEP working alongside various 'associate partner' organisations that were themselves needing individuals or groups to become part of their distribution chains. GVEP signed agreements with these new partners, shown in Table 3 for Kenya and Uganda, to help train their 'entrepreneurs' and in some cases also help with recruitment. Interestingly some of the new partners were DEEP enterprises themselves (e.g. the 'Keyo Women' group of entrepreneurs) or had previously been supported by similar programmes to DEEP (e.g. Solar Sister, previously supported by E+Co).

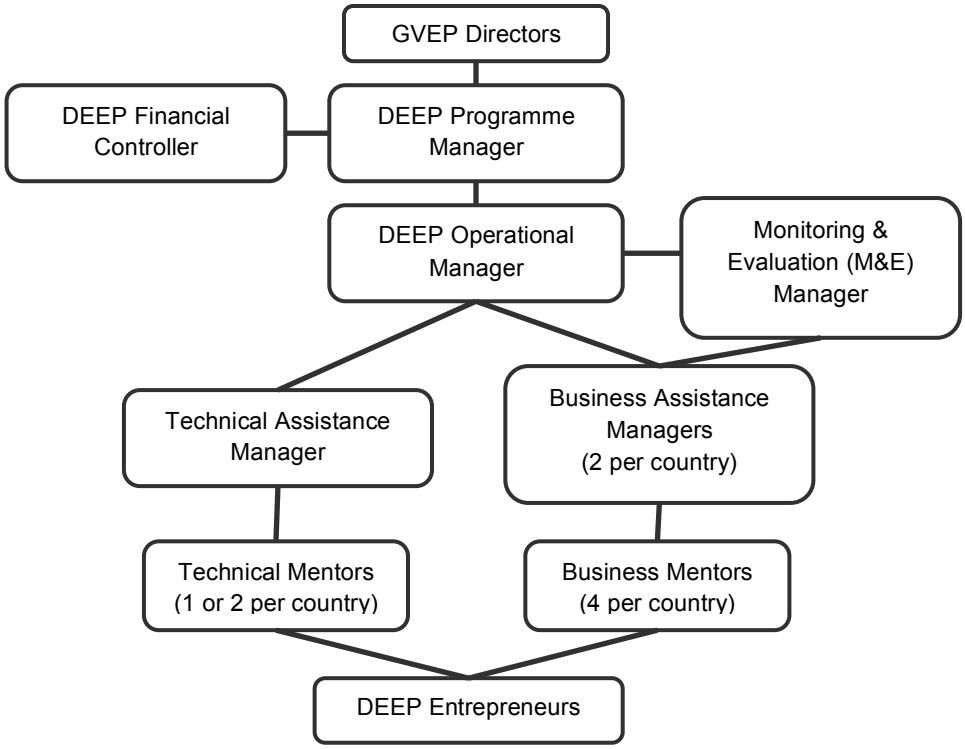
Table 3: DEEP associate partners in Kenya and Uganda (GVEP International, 2012b)

Country	Associate Partner	Technology
Kenya	Keyo Women	Cookstoves
	SCODE	Cookstoves & Solar
	ToughStuff	Solar
	LakeNet	Cookstoves
	Kariestop	Cookstoves
	Sollatek	Solar
Uganda	Barefoot Power	Solar
	Solar Sisters	Solar
	Up Energy	Cookstoves
	Heifer International	Biogas

DEEP staff and structure

Figure 20 shows the operational arrangement of DEEP. After their recruitment, DEEP entrepreneurs received three days of intensive business and technology training. They then received ongoing support from DEEP business mentors who visited them between weekly and monthly. The DEEP technology mentors, who were local IT Power employees, also made less regular visits. The business mentors were therefore at the 'front-line' of DEEP, having the most frequent interaction with the entrepreneurs. There was initially a huge body of part-time mentors recruited, with an original aim that DEEP would "train, qualify and employ a cadre of 300 business mentors" (GVEP International, 2006). However, a new streamlining strategy in 2011 had reduced the number to only four business mentors in each country and made them permanent full-time employees of GVEP.

Figure 20: Schematic of DEEP staff structure (Source: Author)



Financing under DEEP

At the proposal stage DEEP was envisaged to be accompanied by a "complementary GVEP Energy Access Fund for East Africa, a €11.8M investment fund that will provide business finance in the €75 to €75,000 deal range to viable, small-scale enterprises" (GVEP International, 2006). This fund did not subsequently come to fruition, however, and instead a system of financial linkage was developed

whereby GVEP acted as a loan negotiator and guarantor. GVEP negotiated with in-country microfinance organisations and banks, including local savings and credit co-operatives[7] (SACCOs), to make micro-loans available to DEEP entrepreneurs that were deemed suitable by both GVEP and the financial institutions. GVEP then used ring-fenced funds on a revolving basis to guarantee any loans provided. DEEP staff considered financial linkage an important aspect of the project within a context of high and variable interest rates for business loans. The reduction of risk for the financial providers meant that they could provide fixed and lower interest rates than those offered to non-DEEP customers.

DEEP technologies

The DEEP proposal describes the project as 'technology neutral'; although this is not strictly true (since fossil-based energy services were not supported) it could be considered technology neutral across loosely defined 'sustainable' energy. Within this definition the project covers a fairly broad spectrum of technologies, but some have ended up being more prevalent than others. The most commonly observed energy enterprises during this research were efficient cookstove production and distribution, briquette production from charcoal dust and organic-waste, and using or selling small-scale solar photovoltaic (PV) technology.

Three market maps have therefore been created for the GVEP case study, one for each of the main technology types. The market maps are considered sufficiently generalised to be relevant to both Kenya and Uganda. The specific actors in each country context were different, but on the whole the activities observed in both countries showed similar supply chain structures, supporting service providers, enabling environment factors and persistent barriers. It should be noted that these are highly simplified and are by no means comprehensive market maps, but instead are intended to present some of the primary observations made during the research period before more detailed discussion in the following chapters.

5.6 Clean cookstoves market

Clean or 'improved efficiency' cookstoves have been the subject of development programmes since the 1980s. Having evolved from different designers and for different needs, there are now numerous designs in production in, and imported into, sub-Saharan African countries. For example, for a particularly mountainous

[7] A Savings and Credit Co-operative (SACCO) is effectively a co-operative bank where its members, drawn together by a common factor such as same employer or religious organization, make savings and draw loans. It is usually member managed and democratically governed.

area of Kenya one development intermediary stated that they were specifically designing a stove to emit large volumes of heat so that they could replace open fires as the main source of household heating and cooking. DEEP was generally operating in warmer areas of Kenya and Uganda, however, so in general the aim was to minimise heat loss from the cookstoves in order to maximise cooking efficiency and reduce fuel consumption. There are two main types of improved efficiency stove: portable and built-in. DEEP was predominantly supporting production of the former. The next main distinction was fuel type: firewood or charcoal/briquettes. Most stove-makers made several designs of each, with charcoal stoves relevant for urban and peri-urban areas and firewood stoves for rural areas where firewood tended to be more accessible.

In Kenya the most popular charcoal stove design is the Kenya Ceramic Jiko (KCJ, Photo 5, left). In Uganda, a similar design but with straight vertical edges (Photo 5, right) has emerged from development intermediaries working with the largest cookstove making outfit there, Ugastove. Other cookstove makers have since been trained to make Ugastove-style cookstoves so that the design has become increasingly widespread. For firewood stoves there are several popular designs, including the 'rocket' stove in both Kenya and Uganda and the '*upesi*' (meaning 'quickly' in Swahili) in Kenya. All of these stoves have two main components: a clay liner that provides thermal insulation, and a metal cladding that sits around the liner and forms the main structure of the stove. Many DEEP entrepreneurs made full stoves but there was also a significant level of disaggregation, primarily for KCJ stoves in Kenya, where the liners would be made separately and sold to metal workers who made the cladding and assembled the full stove.

Photo 5: DEEP entrepreneurs with KCJ stoves in Kenya (left); Ugastove design in Uganda (right)

The cookstove market map (Figure 21) uses colour-coded arrows to show the flow of materials, information and finance along the generalised cookstove supply chain being supported by DEEP, and from and to the support service providers. A key omission to this is that wherever material is illustrated flowing along the main supply chain, money is inevitably moving the other way – yet the financial flow has not been illustrated in order to reduce visual complexity. The activities directly associated with DEEP are shaded in pink. The loan guarantee services of DEEP are also shown as offering 'risk reduction' to financial institutions.

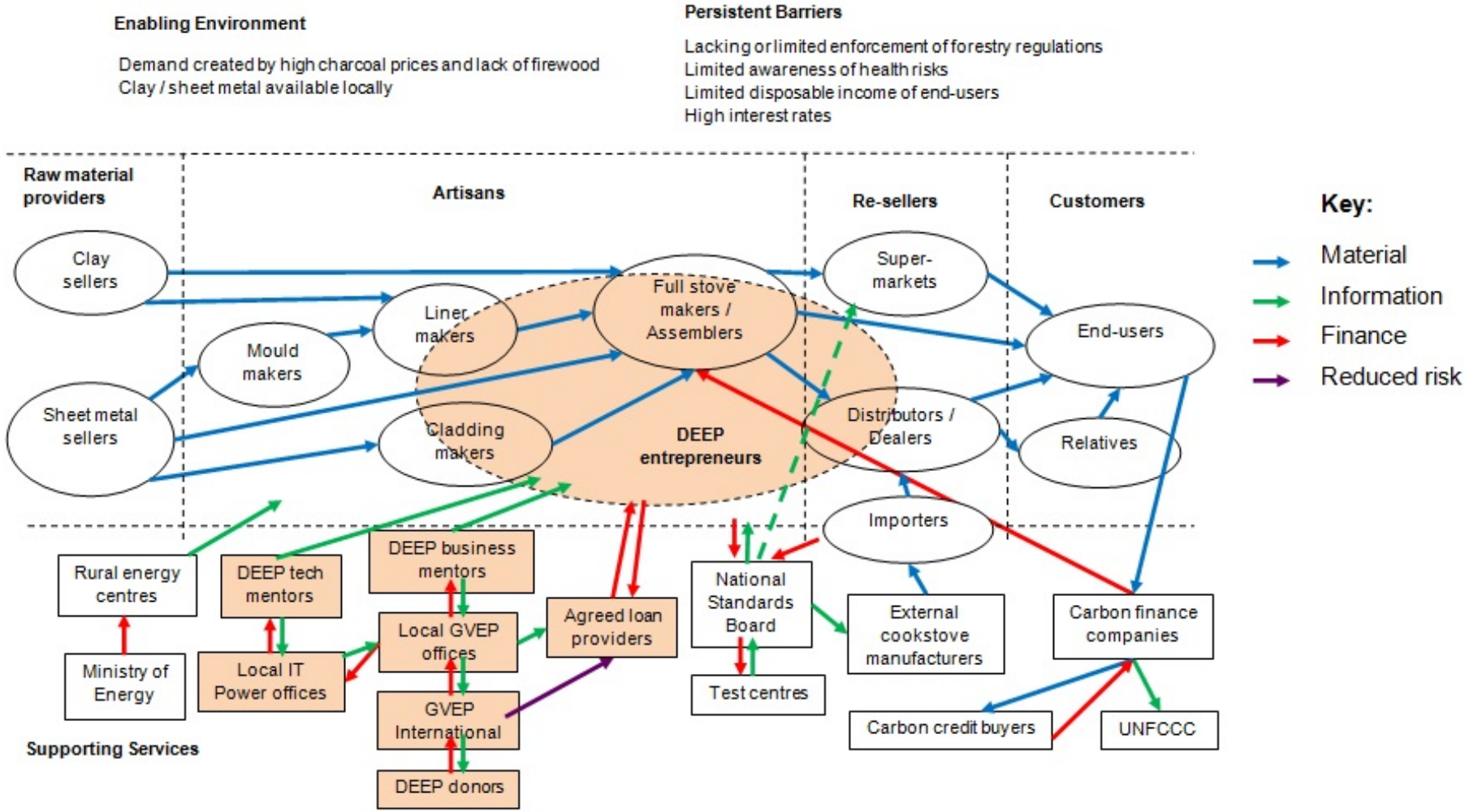
Within the main supply chain, makers of metal moulds used for making cookstove liners have been included within the 'artisans' category as they are seen as key to the quality of liners and viability of disaggregated manufacturing. It is recognised that many other tools are also used but these are less specific to this particular market. Within the 'customers' category, 'relatives' have been included since many cookstove sellers said that their customers were often buying on behalf of their relatives in other locations.

In addition to GVEP/DEEP, other support service providers to the cookstove markets in Kenya and Uganda include the Ministry of Energy in each. These are the ministerial departments responsible for promoting suitable energy sources. For example, the Ministry of Energy in Kenya has set up local energy centres known as 'Mtwapa' to promote awareness of and training in locally viable energy solutions. Carbon finance companies have also been included as support service providers since they facilitate the collection of carbon credits where activities are eligible for them, along with carbon credit buyers and the main carbon finance regulatory body, the UN Framework Convention on Climate Change (UNFCCC).

Importers have been included on the cookstoves market map as service providers to their distributors in Kenya and Uganda, who may or may not also be distributors of locally made cookstoves. Imported products inevitably provide competition to local cookstoves, however. The National Standards Boards and test centres potentially allow local cookstove makers to gain quality certifications for their products, although barriers to this are discussed in the following chapter.

In terms of the main enabling factors for the cookstove market, demand is created by high prices and/or limited availability of the main cooking fuels (firewood and charcoal) so that people are incentivised to reduce their consumption. Availability of the raw materials needed to make the cookstoves (primarily clay for the liners and sheet metal for the cladding) is also key. Some persistent barriers observed, by contrast, were the limited extent of forestry regulations to control firewood collection and charcoal making, meaning that the price of these fuels remained lower than they might have been (or even free as is often the case for firewood). At the same time the limited awareness of health risks of smoke inhalation and low levels of disposable income of potential cookstove buyers meant that buying a higher cost efficient cookstove was not necessarily a priority, and cheaper metal cookstoves (with no clay liner) were often bought or three-stone fires used instead. High interest rates were also seen as a barrier for actors in the supply chain wanting to borrow money to invest in their cookstove-related activities.

Figure 21: GVEP DEEP cookstoves market map, Kenya and Uganda (Source: Author)



5.7 Biomass briquettes market

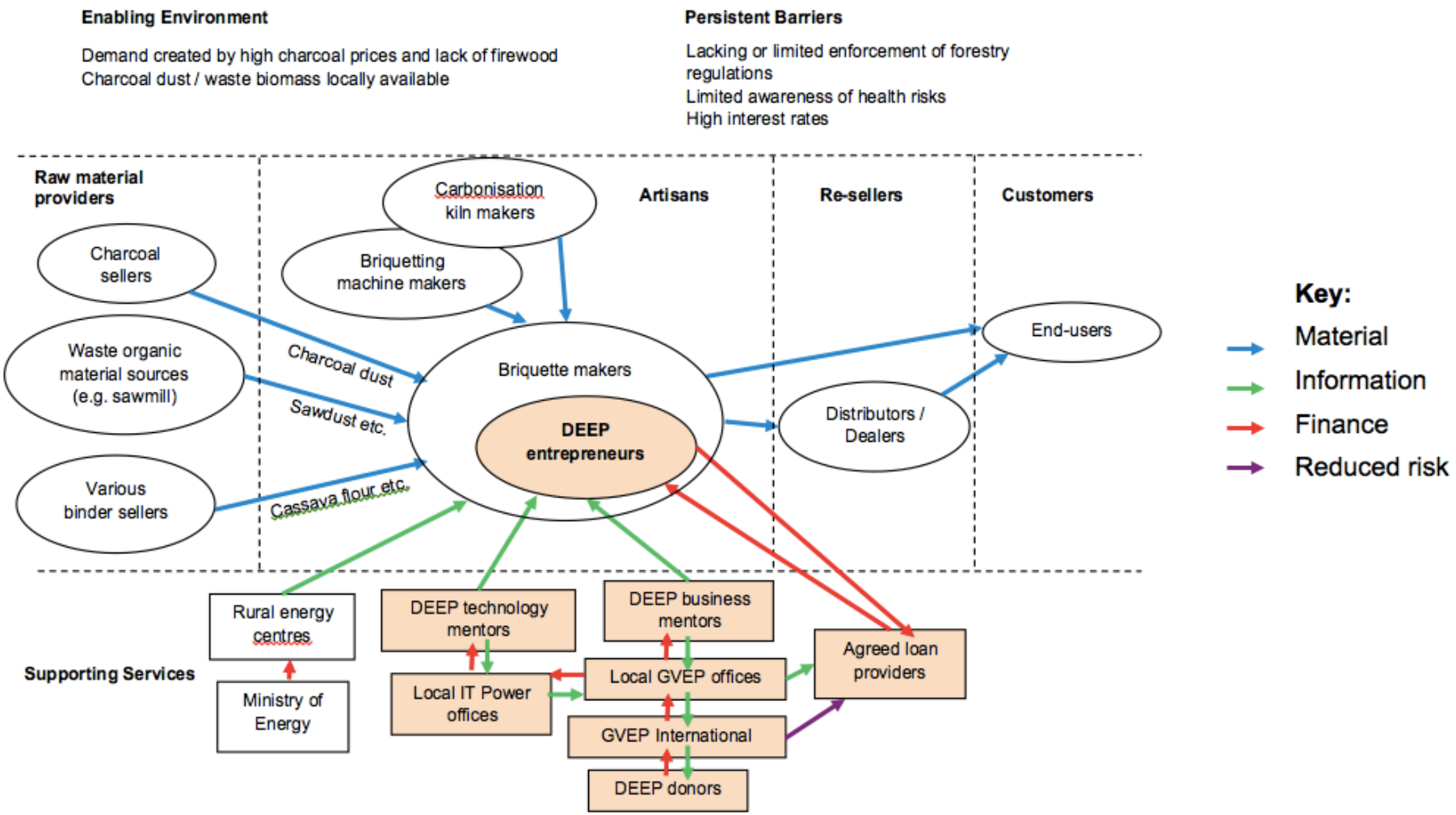
Briquettes are concentrated fuel pellets that can be made out of a variety of organic materials. Ideally waste materials are used so that the briquettes become a more sustainable alternative to firewood and charcoal. The main ingredient tends to depend on what resources are available locally. Many DEEP entrepreneurs involved with biomass briquettes in Kenya and Uganda started off making waste charcoal dust briquettes (Photo 6). They would collect or buy sacks of leftover charcoal scrapings and dust from charcoal sellers, then crush it and mix it together with binder material such as fine clay and/or cassava starch. The individual briquettes could then be made by hand or in manual or automated machines before being put out to dry. The final briquettes are cheaper than charcoal and have longer burning capabilities due to the high density of material.

Photo 6: Machine-made (on table) and hand-made (in hand) charcoal dust briquettes in Uganda (left); coconut husk briquettes in Kenya (right)

Photo 6 (right) also shows a sack of briquettes made from waste coconut husks by DEEP entrepreneurs living in the coastal region of Kenya where there is a large coconut processing industry. The coconut husks were first carbonised in steel or brick kilns or traditional earth pits in order to remove any moisture and increase the energy density – the same process used to make charcoal. It also made the final briquettes burn without producing smoke, providing a health incentive compared to firewood or non-carbonised biomass. Other material that can be made into briquettes includes organic food waste, agricultural residue, animal dung and waste wood scraps or sawdust. If it is not already fine-grained, the material is crushed or chopped before carbonisation; again, this can be done by hand or using machinery with varying levels of automation.

Figure 22 shows the generalised market map and DEEP involvement in production and sale of charcoal dust and organic waste briquettes in Kenya and Uganda. Overall it is much simpler than for improved cookstoves as the production tends to be done by single entities rather than being disaggregated. Carbon finance actors, standards boards and testing facilities are not shown as supporting service providers either as most DEEP briquette-makers had had limited engagement with these. Similar enabling factors and persistent barriers were found as for cookstoves, since demand for alternative fuels is again dependent on the relative availability and desirability of the more commonly used fuels, firewood and charcoal.

Figure 22: GVEP DEEP briquettes market map, Kenya and Uganda (Source: Author)



5.8 Solar phone-charging market

The third market map shows provision of phone charging services from solar PV systems in Kenya and Uganda (Photo 7). Due to the high and increasing levels of mobile phone ownership in sub-Saharan Africa but limited prevalence of electricity connections, there is considerable demand for phone charging. Grid connected shops or kiosks often provide such services, but use of solar panels make it a viable business opportunity more widely. Solar equipment clearly needs to be purchased in the first instance and this is becoming increasingly available in East Africa, if still costly. Kenya, in particular, has one of the most mature and well established solar PV markets in Africa (Integrated Energy Solutions, 2009).

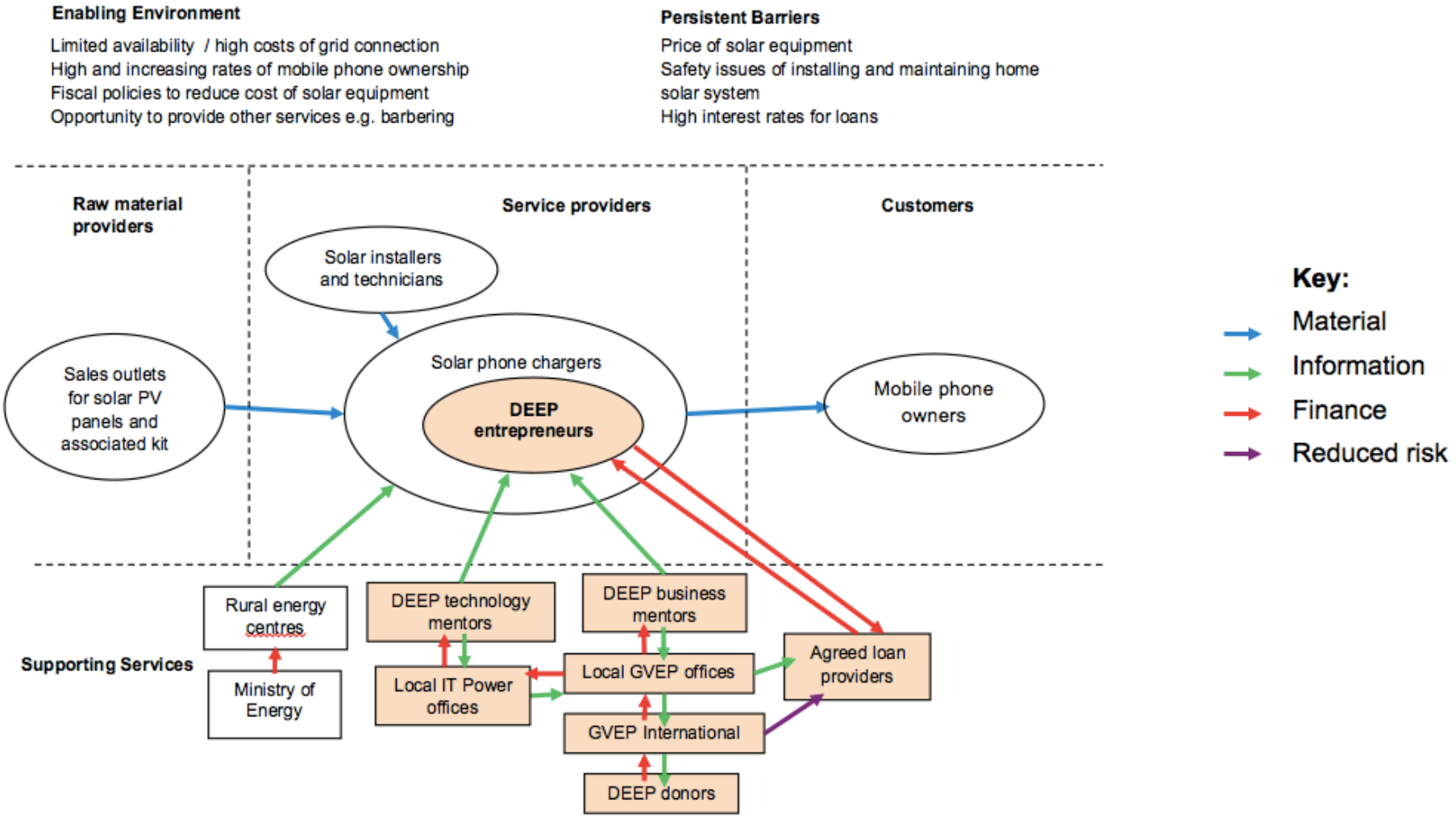
Photo 7: Solar phone charging operations from a DEEP entrepreneur's house, Uganda

The simplified market map (Figure 23) shows a relatively straightforward supply chain compared to the cookstove and briquette markets. Solar phone chargers buy solar PV panels and associated equipment (e.g. car batteries, inverters, cables) and may enlist the services of solar technicians for installation and maintenance. They

then provide charging services to mobile phone owners. The enabling environment includes government support policies for solar technologies, such as zero import duties and VAT on solar equipment in Uganda and Kenya at the time of research. However, this subsequently changed in September 2013 when the Kenyan government removed its VAT relief on solar products altogether, instantly adding 16% to the cost of solar products and removing one of the conditions that had been seen as instrumental in making Kenya's small-scale solar market one of the most developed in Africa.

Other enabling factors include the high and increasing rates of mobile phone ownership and the limited availability and high costs of electricity grid connections. A solar charging station can also be used to provide other paid-for services such as barbershops. Despite fiscal policies to promote solar, the equipment prices remain relatively high for 'BOP' entrepreneurs, however, and again high interest rates on loans limit the viability of going into debt in order to make the necessary purchases. There are also safety and technical hurdles associated with establishing a solar PV system.

Figure 23: GVEP DEEP solar phone charging market map, Kenya and Uganda (Source: Author)



5.9 Case study 2: SolarAid's SunnyMoney in Malawi

After a brief trip back to the UK, I arrived in Malawi in March 2012 and instead of staying in its capital city, Lilongwe, this time I took a much longer first journey by dusty AXA coach to the country's third largest city, Mzuzu. Although it is the fastest growing city in Malawi, a population of only 134,000 in 2008 (National Statistical Office of Malawi, 2009) makes it considerably smaller than either Nairobi or Kampala and it certainly had a much more relaxed and rural feel to it. In fact the rest of Malawi also invoked a similar feeling, with a limited network of tarmac roads, little traffic and the tranquil turquoise of Lake Malawi never far from view, at least in the north and central regions where I spent the majority of time.

In addition to the different country context, the second case study made for a very interesting comparison with GVEP International's work in Kenya and Uganda. SolarAid, as its name suggests, only works with solar technology so thoughts of cookstoves and briquettes were pushed aside to focus on pico-solar products for lighting and other purposes. SolarAid had become the primary importer and reseller of these in Malawi through its recently formed social enterprise 'SunnyMoney'. The focus here was on pushing sales directly, not just providing support to supply chain entrepreneurs. In SolarAid's Mzuzu office the month-to-date sales figure was written in large black digits across a whiteboard and updated each week. Unlike at GVEP, I was not here to help support market actors, but to actually be part of one.

5.10 Malawi

Malawi, first demarcated as the British protectorate of Nyasaland in 1907, became an independent country in 1964 under the leadership of Dr Hastings Banda. Two years later it became a republic and Banda its first president (Phillips, 1998). Not long after my arrival, the Malawian president since 2004, Bingu wa Mutharika, died unexpectedly. A couple of days of uncertainty ensued as there were rumours that Mutharika's political party, the Democratic Progressive Party (DPP), were planning to by-pass the terms of the Malawi constitution that give the Vice President power if the incumbent dies mid-term. The then-Vice President Joyce Banda had been expelled from the DPP two years previously. However, a peaceful transition did follow and Joyce Banda (no relation to Dr Hastings) was sworn in as the fourth president of Malawi on 7th April 2012, becoming the second female leader of an African nation.

Malawi had a total population of just less than 16 million people in 2012, resulting in a population density of 169 people per km^2. This is less than Uganda but double that of Kenya. As a comparator, Malawi's population density is still significantly lower than that of the UK, however, which in 2012 was 261 people per km^2 (World Bank, 2013). Malawi showed 5.1% GDP growth between 2000 and 2012 but in 2012 Malawi ranked 170th out of 186 countries in the Human Development Index, with a score of 0.418 (UNDP, 2013b). Foreign aid was a popular topic of conversation amongst both locals and the expat community, with people regularly commenting that Malawi has one of the highest rates of NGOs per capita in the world.

Agriculture accounts for 30% of Malawi's gross domestic product (GDP), primarily from exports of tobacco, tea and sugar which together account for 85% of the country's export revenues (National Statistical Office of Malawi, 2011). This makes the country's economic situation in any year highly dependent on climatic conditions that affect crop growth and global prices of the three main commodities. The Malawian national budget is also still heavily dependent on direct foreign aid. In objection to the previous president's economic policies and associated human rights abuses, however, foreign aid for budgetary support had been withdrawn during his second term (Wroe, 2012). One of Joyce Banda's first activities as the new president, therefore, was to commence dialogue with the IMF and other international donors to resolve the situation. This did result in a reinstatement of foreign aid, but only alongside a huge deflation of the Malawian kwacha (Photo 9) in order to appease donors.

Photo 9: Announcement of devaluation in national paper


MALAWI'S PREMIER DAILY
The Daily Times
For News You Can Trust
Govt to devalue Kwacha—Banda
Cable Manufacturers

The freeze in aid had also led to a significant shortage of foreign exchange, which in turn had a real impact on fuel availability. With no domestic oil resources, all of Malawi's fuel is imported and the lack of foreign exchange with which to buy it had led to a critical shortage. This affected transport as fuel stations had no petrol or diesel and drivers resorted to sourcing fuel from the black market. Remote areas needing diesel for generators (for example, Photo 8 shows diesel being delivered to Likoma Island in Lake Malawi to power its mini-grid) and kerosene for lighting

were also seriously affected. Fortunately the main centralised electricity generation in Malawi is from hydropower so this could continue as usual.

Photo 8: Diesel being dropped from the Ilala ferry in Lake Malawi to power diesel generators on Likoma Island

Again, however, relatively few people are connected to the main electricity grid. In 2010, 9% of households were found to have access to electricity, with a higher proportion in urban areas (35%) compared to rural areas (4%) (National Statistical Office of Malawi, 2011). This leads to low overall electrification rates since 85% of the population live in rural areas and only 15% in urban areas (National Statistical Office of Malawi, 2009) The Electricity Supply Corporation of Malawi is a state-owned organisation responsible for grid electricity generation and supply. Other than some relatively small solar pilot projects it has had limited involvement in off-grid generation. Figure 24 shows that paraffin (referred to as kerosene elsewhere in this thesis) is the most commonly used source of energy for lighting in Malawi (86%). In urban areas 46.5% of households used paraffin for lighting and 92.6% in rural areas. The third most common source for lighting after paraffin and electricity is candles, used by 3.2% of the population overall.

Figure 24: Main sources of energy for lighting (National Statistical Office of Malawi, 2009)

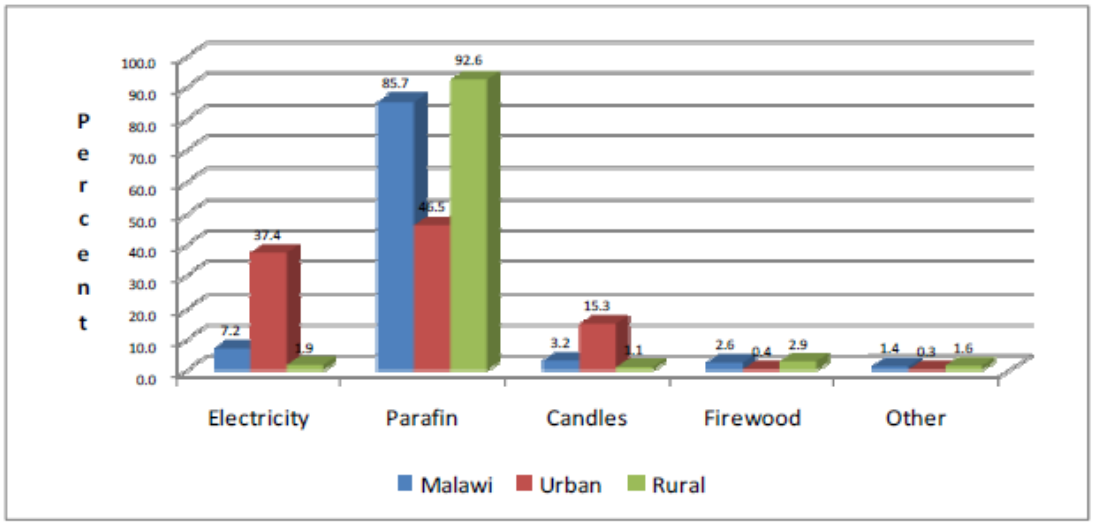
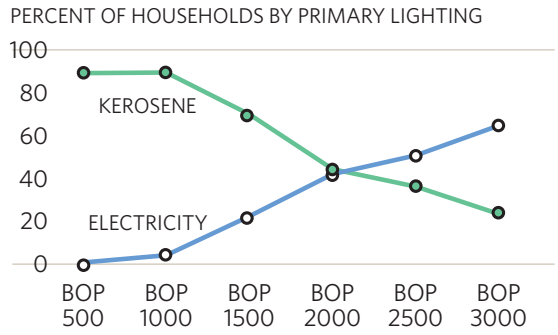


Figure 25 shows how reliance on kerosene for lighting reduces as households increase in income level, so that around 90% households with annual incomes of US$1000 (in local purchasing power) or less (BOP1000 and BOP500) use kerosene and virtually none use electricity, whilst at income levels of US$2000 the percentages are roughly equal at around 40% of households using kerosene and 40% electricity.

Figure 25: Percentage of Malawian households using kerosene and electricity as primary lighting source (Hammond et al., 2007)



Since low-income households in rural areas evidently have the lowest levels of electricity access, low cost pico-solar technology has been recognised as offering a viable solution. Furthermore, where they are available, limited reliability of electricity connections and frequent blackouts provide further demand for stand-alone back-up options. The Millennium Cities Initiative, for example, undertook a survey in October 2010 of the willingness of low-income residents in Blantyre to buy a d.light Nova 200 solar lantern at a price equivalent to US$40 at the time,

approximately a 45% mark-up from the estimated import cost of US$22. 70% of off-grid households and 37% of grid-connected households surveyed thought that they would buy one (Brailey et al., 2010).

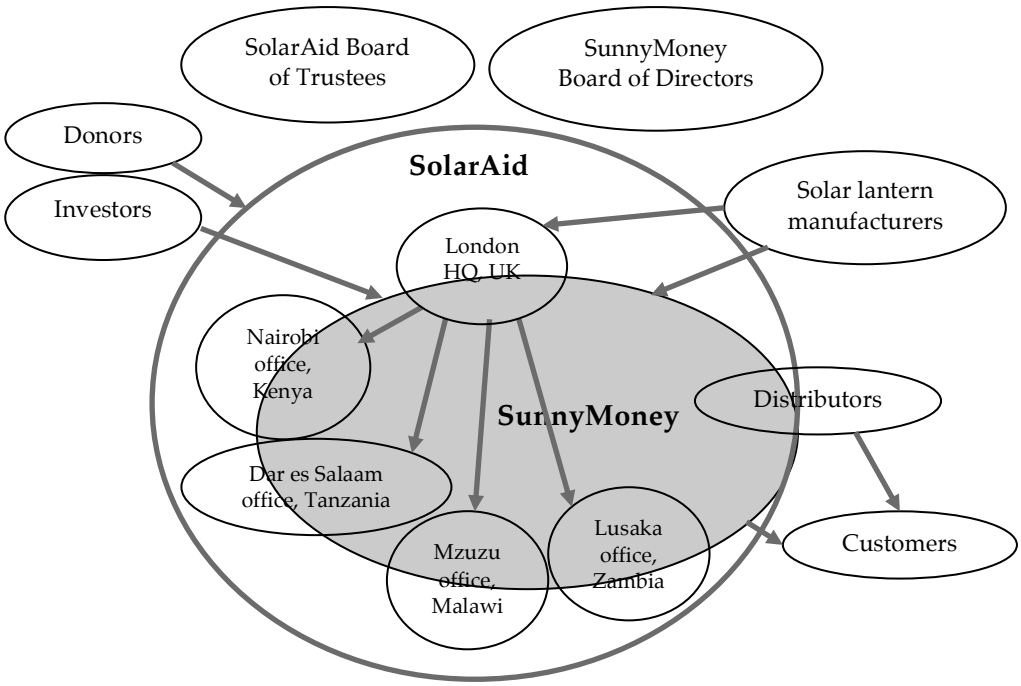
5.11 Introduction to SolarAid

Headquartered in the UK, SolarAid is a non-profit organisation registered with the UK Charity Commission. It was founded in 2006 after the director of British for-profit solar company Solarcentury dedicated 5% of company profits for the purpose. SolarAid aims to eradicate the kerosene lantern from Africa by the end of 2020. In 2012 it was working in Kenya, Tanzania, Zambia and Malawi and in the financial year 2011/2012 it spent just over £3 million on charitable activities in those countries (Charity Commission UK, 2013).

In 2008 SolarAid installed their first macro-solar system in Malawi and set up a training programme for HIV/Aids-affected youth to assemble and sell pico-solar panels. The organisation subsequently decided to phase out local production in favour of imported products, however, due to quality, cost and scale-up issues encountered with their initial approach (SolarAid, 2010). They moved to recruiting sales people for pico-solar lanterns and until 2011 continued to install larger solar systems at health clinics and schools on a cost-share basis funded by specific donor packages. By the time of this research, these 'macro-solar' projects had been completed other than ongoing administrative work, and the focus was on SunnyMoney, a new 'social enterprise' established to import and distribute solar lanterns on a commercial basis, with the ultimate intention of financial sustainability.

Figure 26 illustrates the organisational structure of SolarAid and SunnyMoney. Due to the nature of SolarAid as a charity and SunnyMoney as a social enterprise, it shows both donors and investors. At the time of research, investors were still being sought so that SunnyMoney operations remained almost entirely dependent on SolarAid, besides the surplus generated from solar sales.

Figure 26: Schematic of SolarAid / SunnyMoney organisational structure (Source: Author)



SolarAid Malawi organised its activities from several small offices within the smart, concrete facilities of the Mzuzu Sunbird hotel. As the main hotel for officials and business people coming to the city, it provided a professional feeling environment and, perhaps more importantly, a reliable electricity supply and internet services. This SolarAid office employed around ten people at the time of research, with six permanent staff and four interns that worked on an ad-hoc basis. When I arrived in March 2012, all of the staff working there were Malawian nationals. An Irish expatriate had set up the office in 2008 and subsequently been in a senior management position, but had left in 2011. Most NGOs in Malawi tend to locate themselves in the capital of Lilongwe or the bustling city of Blantyre in the south of the country, but Mzuzu had become SolarAid's home because existing connections with a local community group had led to them being trained as SolarAid's first solar assemblers in Malawi.

Photo 9: SolarAid staff having a meeting in the Mzuzu office, May 2012

5.12 SunnyMoney

SunnyMoney is registered as a social enterprise. As is written on the separate website dedicated to it: "SunnyMoney is owned by the charity SolarAid – but it is a business with the social goal of increasing access to solar lights and reducing reliance on kerosene lamps" (Sunny Money, 2013). SunnyMoney is registered as a private limited company with Companies House after its incorporation in September 2011 (Companies House, 2013). Its core business is to import pico-solar products into SolarAid's countries of operation and establish extensive sales chains, particularly to reach low-income households in rural areas where there is least access to modern electricity services.

Photo 10: SunnyMoney kiosk in Mzuzu market

In its first financial year (2011/12) SunnyMoney estimated that an average of 142 lights were sold a day, equivalent to just under 18 lights per working hour. By January 2012 over 50,000 solar lanterns had been sold in total (SolarAid, 2012) and this increased to over 500,000 by June 2013 (SolarAid, 2013a). Direct sales were made from their offices, events and travelling staff, and indirect sales via local dealers and newly recruited and existing solar 'entrepreneurs'. In Malawi, two entrepreneurs who had previously been trained as solar assemblers were supported to set up SunnyMoney kiosks in Mzuzu (Photo 10) and Nkhata Bay, around 40 minutes east of Mzuzu on the shore of Lake Malawi.

Partnerships were also made or strengthened with other organisations that had access to particular groups of people, including hospitals and health centres, religious groups, schools and businesses. Companies such as sugar and coffee estates in Malawi, for example, were found to be able to overcome customers' financial hurdles if they were willing to support credit-based purchases, whereby the company paid for solar lantern orders up-front but employees paid retrospectively via salary deductions. On Mafia Island in Tanzania, a pilot campaign proved particularly successful. It targeted schools in new market areas by offering every student the opportunity to buy a discounted basic lantern. This lead to 40% of the island's school students ultimately buying a light and catalysing huge interest and additional purchases amongst other residents. This sales model was quickly transferred to operations in the other countries; during my research period in Malawi a strong focus was being put on the new 'schools campaign'.

SunnyMoney technologies

The solar lanterns sold by SunnyMoney in Malawi could all be classified as pico-PV systems, based on this term being applied to systems of up to 10 Watts (Table 4). The information and marketing material from SolarAid, SunnyMoney, the solar lantern manufacturers and other development intermediaries working with pico-solar products promote them as providing clean and good quality light at a low cost with simplicity of installation and operation. These advantages tend to be juxtaposed with the disadvantages of traditional lighting alternatives, including health and safety issues (poor light quality, smoke inhalation and household fire risk) and the ongoing payments required. For example, the German development agency GIZ cites research that finds: "The cost for running the typically used low-efficiency kerosene wick lamps and candles is up to 150 times higher than for premium-efficient fluorescent lamps [powered by grid electricity.]" (2010 p.6)

Table 4: Classification of solar systems (GIZ, 2010)

System Name	Number of Households	Power (Watts)
Multi-user system (MUS)	2 to 400	200 to 5,000
Solar home system (SHS)	1	10 to 200
Pico PV system	1	Up to 10

SunnyMoney's products were being sourced from four companies, all self-described as for-profit social enterprises and variously originating from Australia (Barefoot Power, Photo 11), the UK (ToughStuff, Photo 12, left) and the US (Greenlight Planet, Photo 12, right and d.light design, Photo 13). D.light design's S1 solar lantern held particular importance as the discounted lantern offered to students under the new schools campaign. Overall the products ranged from fully integrated solar lanterns like the S1 where the solar panel was incorporated into the body of the light, to single and multi-light kits with separate panels, as well as separate battery packs for the larger systems. Many of them also had mobile phone charging capability and some of them could power small radios. All of the lanterns and lighting kits were manufactured in China. Although none of these companies had direct presence in Malawi, many had their own operations in Kenya and Uganda and it was therefore possible to interview representatives from all except Greenlight Planet.

Photo 11: Barefoot Power 1.5W Firefly (left) and 2.5W Powerpack Junior (right)

Photo 12: ToughStuff 1W panel and light (left); Greenlight Planet 2.5W Sun King Pro (right)

Photo 13: 0.5W d.light S1 being displayed by SolarAid staff

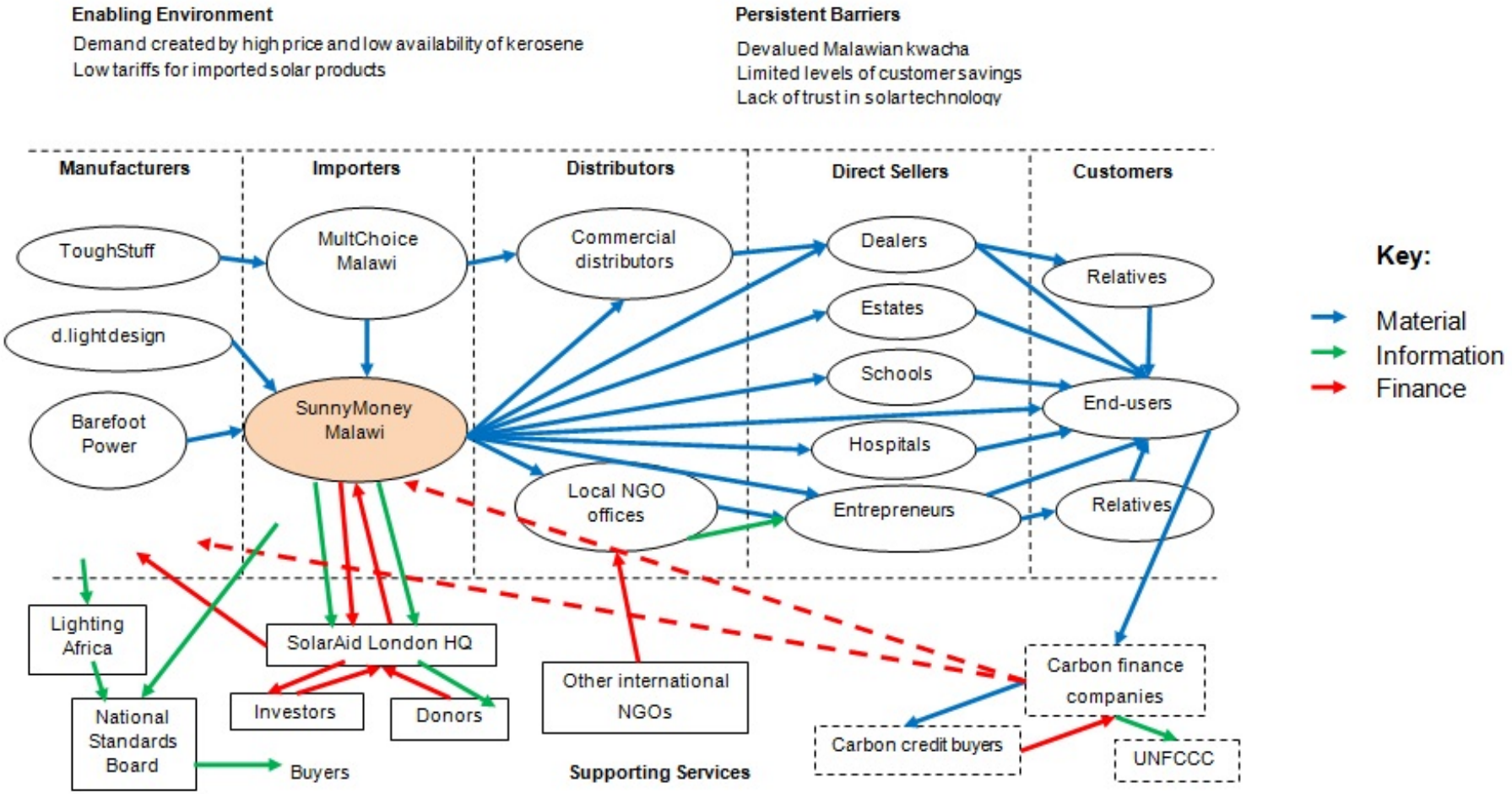
5.13 Solar lantern market

Figure 27 shows the market map constructed for SolarAid's SunnyMoney activities based on the period of participant observation. Again, the market map uses colour-coded arrows to show the flow of materials, information and finance. Whenever material is illustrated flowing one way, money is flowing the other way – yet the financial flow has not been illustrated on the main supply chain in order to reduce visual complexity. Unlike for the GVEP market maps, here the activities directly related to the SunnyMoney initiative have not been colour-coded, since SunnyMoney is an integral market actor and therefore interacts with the majority of the rest of the market chain in some way. This illustrates an important difference between the two case study approaches.

Although carbon finance actors have been included on the market map, they have been put within dashed lines to illustrate the complexity of efforts to obtain carbon credits from SunnyMoney's supply chain that became evident during the research, as described further in Chapter 6. Other supporting service providers include the Malawian National Standards Board that instigate and check the standards of imported products, and Lighting Africa, a World Bank/IFC funded initiative that has developed international standards and testing procedures for pico-solar products, as well as undertaking other support services such as research studies.

In terms of the enabling environment, the relative availability and price of kerosene has a key impact on making pico-solar products a viable alternative. The Malawian government has exempted solar lamps from import duties, which helps to increase the imported products' ability to compete with other lighting options. Unfortunately the devaluation of the Malawian kwacha that occurred in the early parts of the new presidency caused a huge increase in the local prices of imported products, particularly a barrier in the context of limited levels of customer savings. Trust of solar technology also appeared to be an issue for some potential customers, generated from earlier experiences of limited technical support and in some cases low quality solar products.

Figure 27: SunnyMoney solar lantern market map, Malawi (Source: Author)



5.14 Chapter summary

This chapter has described the case study organisations, the country contexts that their activities and this research were undertaken in, and the marketisation activities that they engage in. Market maps have been created to show the market systems that the development intermediaries are trying to shape. These have become a popular tool in market-based development approaches and the format used here is derived from Practical Action's market mapping framework (Albu and Griffith, 2005). Responding to Çalışkan and Callon's (2010) recommendation of firstly identifying marketisation actors, it has provided a platform for considering the main market actors within the product supply chains and those providing supporting services. Some of the enabling factors and ongoing barriers to marketisation activities around sustainable energy products and services have also been identified on the maps.

Latour's (1987) writings highlight, however, that this type of simplification involves depicting a market system as a 'cold' stable object. While it can be argued as a useful way to provide a visual overview of the case studies, which is the intended purpose here, the next step is to consider how this stabilised conceptualisation has come into being and to acknowledge that it is not necessarily an accurate or complete portrayal of the situation. Instead its constituent elements have been, and are continually being, produced and performed and the system is in constant flux over time. Different actors within or outside of a market can also see it in very different ways. These market maps are based on a specific time period of observations made primarily from the vantage point of the development intermediaries being studied. The market systems conceptualised should therefore be treated as warmer, unstable socio-technical assemblages that vary over time and depending on observer positioning. The remainder of this thesis explores them on that basis.

6 The energy products: how their meanings and values are produced

> Nothing moves on its own. If a good is produced it is because it has a value for its producer; if it is distributed it is because it is a source of value for its distributor; and if it is consumed it is because it has a value in its consumer's eyes. (Çalişkan and Callon, 2009 p.389)

SolarAid's success in offering a product that numerous consumers can be persuaded to buy is evident with their sales of over 500,000 solar lanterns (SolarAid, 2013a) over the three years since they started importing ready-made lamps and lighting kits in to their four countries of operation. These sales show that the characteristics seen in the products by prospective consumers match some of their personal needs and desires. Success is similarly evident for GVEP: during the last 3 month period of my research, they calculated that their 300 or so efficient cookstove entrepreneurs generated a combined gross income of just under US$310,000 from selling complete cookstoves, or parts thereof (GVEP International, 2012c). Again, the products now clearly had local relevance.

This chapter puts the key non-human actors at the centre of the marketisation process: the products themselves. As discussed in Chapter 3, work by Latour (1992, 2005) and others has shown the pivotal role that the capabilities of technologies and meanings people associate with them have in how market processes unfold. Everyone who interacts with the same product does not necessarily see the same characteristics. A particular buyer may be persuaded by different attributes of a product than those that entice another buyer. Equally, along the product's journey from designers, importers (where relevant), local distributors to end-users, the meanings associated with the product will vary significantly, affecting how people choose to act. As Appadurai (1986) shows in his seminal work, all objects have a social life.

Given the wide variety of values that products are assigned over their lifetime, efforts must be made to qualify their characteristics in an apparently objective, scientific manner in order to make them of consistent design and quality and comparable against competing designs or products. Using Callon's (2002) terminology, this is the continuous qualification and requalification of evolving products. The processes involved require a broad toolset of 'market devices' (Callon et al., 2007) such as measuring and testing procedures, generic standards and

certification bodies, before the products' characteristics are communicated to end-users through artefacts such as advertising materials and instruction manuals. Combined with external factors, meaning and value is thus shaped and feeds into pricing negotiations. As Çalışkan and Callon (2009) highlight, no value is pre-determined or fixed, and the price point for exchange depends on a product's relative valuation by different stakeholders along its socio-technical history.

This chapter examines these processes in detail and addresses the second research question:

> How are the clean energy products stabilised, qualified, valued and priced for exchange as market goods?

It starts by describing how these products come into existence through their 'problematisation': their ability to solve a particular 'problem' for developing country contexts that allows them to be framed as humanitarian goods. This framing incentivises marketisation efforts, but it does also place restrictions on what products emerge, and at the same time displaced technologies remain out of sight from the positive 'development' conceptualisation. Although job creation is not specifically the central problematisation here, local manufacturing of cookstoves is seen to more easily lead to locally appropriate innovation, due to greater access to end-user feedback and understanding local resource availability. Where products are imported they do clearly now have local relevance through considerable efforts to set up similar communication channels. Subsequently the products' optimal usage also requires communication from absent manufacturers, however, and it is argued that there remains room for simple improvements; even translating instruction sheets into local languages can help bring cursory materials to life.

The detailed processes of qualification are examined here, and it is shown that market devices for processes such as standardisation vary greatly according to the market context and level of formalisation. Even simple standardisation tools such as specifically sized cookstove liner moulds have been significant for market growth of particular cookstove designs, by facilitating disaggregated manufacturing. By comparison, some 'imported' market devices such as warranty card schemes require extensive social and technical configurations to complete them and even absence of a paper receipt can immediately make them defunct. Devices for quality testing, standards certification, patenting and generating carbon credits may be inaccessible to local manufacturers for similar reasons. The 'informal economy' can find its own solutions to some of these issues, but power asymmetries arise when 'macro' actors

can attach greater value to their products out of access to the 'black boxes' of such devices.

6.1 Problematisation to create humanitarian goods

Both of the development intermediaries I worked with were keen to highlight from the outset that, while employment generation through enterprise development was certainly a benefit of their work, the key challenge being addressed was provision of clean energy products to those currently without access to safe, reliable and appropriately priced solutions. The organisations' existence and indeed the products they promoted had emerged from the context of just under 1.3 billion people having no access to electricity and 2.6 billion relying on traditional biomass for cooking (IEA et al., 2010).

The problem of kerosene

At my first meetings with SolarAid, and indeed in all of their publicity material, it is clearly stated that 'eradicating the kerosene lantern in Africa by the end of this decade' (i.e., by 2020) is their primary goal. In fact it is such a challenging but key focus for them that they have called it their 'BHAG' for 'Big Hairy Audacious Goal'. They use the negative health impacts and continuous costs of using kerosene as a lighting fuel to underpin their promotion of solar lanterns as a better solution.

> 598 million off-grid Africans have no access to electricity and many rely on toxic kerosene for lighting. These brutal lamps emit noxious black smoke and burn up to 20% of the household income – locking millions into poverty. (SolarAid, 2013a)

Cross (2013) identifies the same starting point for other actors in the solar lantern industry, referring to the identification of a central problem that a 'humanitarian good' is designed to solve as 'problematisation': "The significance of the solar light as a humanitarian good has come to hinge on the 'problem' of kerosene" (ibid., p.14).

This problematisation is strategic for products specifically depicted as solving a 'development problem', as they tend to rely on the engagement of donor agencies and individuals wanting to identify the product's humanitarian benefits. Of course all products need to engage prospective consumers by demonstrating how they solve a specific problem through use, and most also need to engage investors by further identifying the commercial potential of solving this problem for consumers. In this case, however, the buy-in of a third type of stakeholder is also key. SolarAid still rely on individual donations, grants and awards for their core funding for

operations. For example, they recently won an International Gold through the Ashden Awards, leading to a further £40,000 of funding and extensive publicity. The Ashden Awards specifically seek out and exemplify "practical, local energy solutions that cut carbon, protect the environment, reduce poverty and improve people's lives" (Ashden, 2013).

For SolarAid the humanitarian perspective is also important in encouraging non-charitable investment. Originally they considered engaging standard venture capitalists to provide the working capital needed to expand their commercial venture SunnyMoney (having used SolarAid's charitable funds for preliminary start-up investment). However, more recently they were exploring crowd-funding[8] and impact investment[9] options (Leggett, 2012), both of which require a business to demonstrate its added social benefits to potential investors, as well as its profit-making potential.

The problem of employment

SolarAid's original approach prior to importing solar lanterns manufactured in China or India was local assembly of 'Kadzuwa' (meaning 'little sun' in Chichewa) solar lighting kits from local and imported parts: solar glass, wood for frames, electrical wires, rechargeable LED lights, mobile phone charging connectors and other small components, to create a simple solar kit that could be used to charge LED lights, mobile phones and other small electronic devices, as well as power radios. My first encounter with SolarAid was actually several years prior to embarking on doctoral research, during a visit to a crafts workshop for disabled people established by Christian missionaries in the small high-altitude town of Iringa in western Tanzania. Neema Crafts had grown into an enterprise employing around 100 people and branching into various activities, including a solar kit assembly operation following training from one of SolarAid's founders in 2007. During a visit there I was proudly shown the solar-assembly workshop where several disabled people were making the same kits mentioned above (Photo 14). Interestingly here, although obviously the benefits of replacing kerosene with solar were recognised, it was not the primary problematisation of the solar initiative:

> […] while this is all great, the real reason why Neema Crafts makes these Solar kits is different. In Tanzania disabled people are often looked on as a burden on their families and communities; as people who cannot contribute to society in any way.

[8] Online crowd-funding platforms allow individuals to make micro-investments in businesses of their choice. SolarAid was already participating in SunFunder's solar investment platform (www.sunfunder.com).
[9] Impact investment is the term given to funds selectively investing in activities with high levels of social or environmental benefits.

> When our disabled workers take the solar panels and kits out to the villages to sell and people learn that these disabled people made this, it quite simply blows their minds. They had never thought it possible that a disabled person could make something so sought after and so useful! It is a tremendous advocacy tool for us in our work trying to promote deaf and disabled people in the community. (Neema Crafts, 2013)

Similarly SolarAid started its operations in Malawi by training local groups of HIV-affected youths to undertake the same type of solar kit assembly, again with a second problematisation of the need for employment opportunities for this group of actors.

However, in terms of their primary aim of replacing kerosene, SolarAid management later stated that local assembly made it too difficult to ensure quality, to scale-up production sufficiently and even to be cost efficient, given import tariff discounts for complete solar products but not their component parts. The approach was therefore halted in favour of importing externally manufactured solar lanterns that, it felt, would allow greater sales to be achieved more quickly and thus replace more kerosene lanterns. On a visit to the SolarAid warehouse in Mzuzu I could see boxes of these original kits left unsold (Photo 14). I also heard that Neema was considering stopping their production after other initiatives had started up locally to sell the same imported solar lamps that SunnyMoney now focuses on, making the locally made kits unable to compete.

Photo 14: Neema Crafts solar workshop, 2009 (left); unsold Kadzuwa solar kits in SolarAid Mzuzu warehouse, 2012 (right)

From a social benefit perspective, it can easily be argued that SolarAid's first approach in fact had more diverse impacts per number of sales made, providing jobs for local people beyond simply the role of selling imported products. A monitoring report from SolarAid Malawi in 2009 highlights the diverse benefits to

the local solar trainees. It states that out of 227 trainees, 157 said they were still using their solar technical and business skills, with many finding the pico-solar business lucrative and feeling a sense of job fulfilment. In particular, focus groups had found that the solar entrepreneurs' employment in pico-solar:

> […] was a key survival strategy over the 'hunger season' (the period from November to March following the planting season, waiting for the harvests). The income generated from microsolar sales and assembly enabled individuals (most of whom are dependent on the tobacco harvest) to buy basic food and medicine over this normally difficult time." (SolarAid (2009) p.9)

Some individual case studies of solar assemblers are also provided in the report, such as that of Gloria Mgala shown below.

Figure 28: Case study of solar assembly trainee in Malawi (SolarAid, 2009)

Gloria Mgala, Solar Assembly trainee, Chikangawa, Malawi

This is Gloria. She is 19 years old and a volunteer teacher in a small remote primary school in an impoverished area near the Raiply wood processing plant. She is a volunteer because the school cannot afford to pay her, so the children bring small donations of money and food from their parents. This is just enough to support herself, her widowed mother, elderly Grandmother and 5 brothers and sisters.

Gloria recently received solar assembly training from SolarAid. She is currently assembling 20 panels a month and plans to increase production to 100 in order to support her families income and save up to study mathematics and computing.

"Most of the villages in this area do not have light because they can not afford to pay. When I show people they Kadzuwa they are excited that it is so affordable to them. They also do not believe me when I tell them that I made it - many people think that we girls are not supposed to take technical jobs, but now I am showing them that women are capable too!"

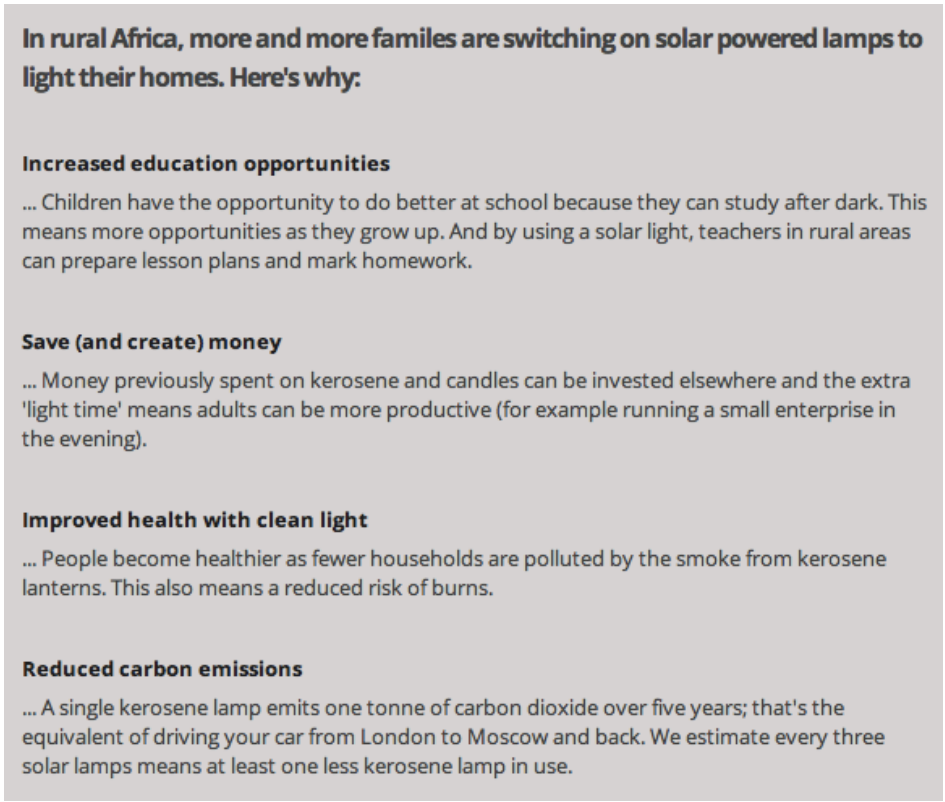
However, employment was never SolarAid's primary aim and the goal of eradicating kerosene lanterns was always dominant. It is not inconceivable that, had they wished to continue with their initial approach, the 'problem' of kerosene could have been in combination or indeed overshadowed by the 'problem' of limited local employment opportunities, particularly for specific groups. This problematisation would have identified solar kit assembly and sales as a viable income-stream for all types of people and may have secured enough development sector support to scale up and formalise the local assembly model. Fortunately the most active solar

assemblers were able to be absorbed into the new approach, selling the imported lanterns instead of assembling and selling home-made kits, but few 'entrepreneurs' have been recruited and trained by SolarAid in the same way since.

The problem of education

A variation on the kerosene issue for SolarAid is the need for good quality and affordable lighting (i.e. not kerosene or candles, as shown in Photo 15) for children to use to study after school. This has become an increasing focus in the way they frame solar lanterns as humanitarian goods. It is particularly strategic since their search for new distribution channels now targets schools as networks through which to advertise and sell the lights. End-users I spoke to had many uses for pico-solar systems, particularly for lighting sales kiosks at night and charging mobile phones. However, SolarAid now put education opportunities top in the list of reasons for purchase, followed by money saving and creation (Figure 29). Equally their winning Ashden Award application prioritises education: "The immediate benefits are immeasurable: children are able to study in the evening, polluting and dangerous kerosene is avoided, and families save money." (Ashden, 2013)

Figure 29: List of reasons for buying solar lamps on SolarAid website (SolarAid, 2013b)



In rural Africa, more and more familes are switching on solar powered lamps to light their homes. Here's why:

Increased education opportunities

... Children have the opportunity to do better at school because they can study after dark. This means more opportunities as they grow up. And by using a solar light, teachers in rural areas can prepare lesson plans and mark homework.

Save (and create) money

... Money previously spent on kerosene and candles can be invested elsewhere and the extra 'light time' means adults can be more productive (for example running a small enterprise in the evening).

Improved health with clean light

... People become healthier as fewer households are polluted by the smoke from kerosene lanterns. This also means a reduced risk of burns.

Reduced carbon emissions

... A single kerosene lamp emits one tonne of carbon dioxide over five years; that's the equivalent of driving your car from London to Moscow and back. We estimate every three solar lamps means at least one less kerosene lamp in use.

Photo 15: Classroom in Karonga, northern Malawi, with children studying using candles and kerosene lamps

This leads the framing of solar lanterns as humanitarian goods to be hinged on the problem of lighting for children's education. Visits during the research showed that this was clearly a legitimate issue, as Photo 15 demonstrates. The need to reinforce the humanitarian application of products can lead to a narrow portrayal of a technology's diverse local applications, however. The key focus is always on finding and highlighting examples of the product being used in a way that show the consumer as an idealised development beneficiary. When visiting the house of a solar lighting system customer in Mzuzu, for example, I asked whether the owner's children used the light to study at night, in the hope that some photos could be taken as a case study to demonstrate its use for education purposes. He obligingly said 'Yes', and asked his son to come and sit on the floor under one of the light bulbs and read a schoolbook for the photographer. Shortly before leaving the house, the father was engaged in conversation with another staff member so I asked the boy where he studied in the house, thinking it strange that he would always sit on the floor. He led me to a different darker room where there was a dining table and chairs but no light bulbs. I asked him how he could see to study and he showed me a candle. His father clearly knew that we hoped to see the solar lighting system in action aiding his son's schoolwork and had obliged accordingly, even if it was not actually its primary or even common use in this particular case.

The point is not to suggest any misrepresentation on the part of SolarAid, since his son did not get used as a case study, and by contrast I also saw plenty of situations

where children were legitimately using solar lights to study with. Rather it shows how the need to portray products as humanitarian goods still narrows the conceptualisation of end-users (at least in reports, articles and other marketing material destined for supporters' eyes) into development beneficiaries. Efforts are made to identify and showcase examples of products being used in ways that reinforce the consumers as idealised development beneficiaries. While this is arguably a necessity for any organisation dependent on engaging socially conscious donors or investors, it also leads to the continuous production of a development 'need and solution' scenario.

Restricted 'development' view of technologies

Other technologies can also be subject to similar patterns, with mobile phones, for example, often being conceptualised in development literature as development tools. Indeed in many ways they offer relevant benefits, such as facilitating entrepreneurs' connectivity with suppliers and customers, as I discuss in the following chapter. However, the conceptualisation does not provide a complete picture. Molony (2008) illustrates this with ethnographic research from Tanzania which leads him to argue that "in much of Africa mobile phones are more commonly put to a nondevelopmental use" (p.340). Recent research by Pierskalla and Hollenbach (2013) finds that in some African countries mobile phones have in fact escalated incidences of violence due to the increased capacity to co-ordinate violent episodes: "cell phone coverage has a significant and substantive effect on the probability of conflict occurrence" (p.220). They note that mobile phones have also been seen to help co-ordinate counter-insurgency or terrorism efforts and that overall the many benefits of increased connectivity are not negated. However, this example helps highlight that the 'mobile phones for development' rhetoric produces a very narrow view.

Similar occurs with the subject of internet provision. Mercer (2006) states that within some development literature "the Internet is presented as a technological panacea, able to solve all manner of 'development problems'" (p.245) yet her research shows that Tanzanian activities in internet cafés is broadly in line with global trends: the amount of time spent emailing friends and 'surfing' for general entertainment is similar to 'developed' countries. It was estimated, for example, that pornography accounted for a quarter of internet usage at one ICT centre in the study, something that could sound shocking if juxtaposed with 'internet for development' rhetoric, but is in fact not surprising when compared with global internet usage statistics.

As Ferguson (1994) so clearly highlighted, the development industry has a need to produce an image of development needs and solutions that continuously validate and perpetuate its existence. Older models of free allocation of humanitarian goods in particular could be argued to subjectify people as beneficiaries at the same time as denying them agency to value goods themselves and perform consumption activities based on that valuation. My findings here are less critical: solar lamps do replace kerosene and can be used for children to study by, and these applications are focused on as a marketing tool in order to attract continued investment from socially conscious stakeholders. At the same time, prospective customers are able to make their own evaluative judgements and decide to purchase or not based on their own problematisation. There will inevitably be uses of solar lighting, and the mobile phones and radios that are charged by solar systems, for less honourable purposes that do not fit with development rhetoric. 'Consumers' are still free to make that choice, but clearly this is less represented in both the information gathered by solar lamp distributors and the stories fed back to existing and potential supporters.

As I became increasingly absorbed into the development world I inadvertently found myself also wanting to represent prospective consumers as development beneficiaries. One of the problems that efficient cookstoves aim to solve is the smoke inhalation caused by their rural alternative, open three-stone fires, as described in Chapter 5. During my time with GVEP I visited many producers of the cookstoves and some of their happy customers, but it was some time before I had the opportunity to see a traditional three-stone fire in use in a rural home in western Uganda. I naturally asked to take a photo, excited that I would finally be able to illustrate my thesis with a poor Ugandan farmer being exposed to smoke inhalation in his home, thus reinforcing efficient cookstoves as humanitarian goods. However, my host Jared happily and perhaps unsurprisingly does not always have this problem at the forefront of his mind, and in fact seemed to be enjoying using his fireplace to cook me a tasty meal of local crayfish caught in Lake Bunyoni which his house was on the shores of. Each time I tried to take a photo of him cooking over his dangerous and burdensome fireplace, he gave me a beaming smile. For a moment I thought of asking him not to smile, but I realised that this would be asking him to perform the role of prospective development beneficiary in order to create an unfairly narrow conception of him.

Photo 16: Jared happily demonstrating his three-stone fire at his home in western Uganda

Difficulties could also occur with regards to future applications of energy products that do not fit as neatly into development rhetoric as provision of lighting for students to study by or avoiding smoke inhalation. One example is the possible future development of solar television systems.

In his work on solar markets in Kenya, Jacobson (2006) identified a perhaps unexpected prioritisation of television over lighting amongst end-users of solar home systems: "Importantly, most rural Kenyans who can afford a solar PV system choose to buy a TV set before they purchase lights" (ibid., p.148). He found the desire for television in rural homes to be a central driver of the rapid growth of the Kenyan solar market and notes that other studies from China, Thailand, Sri Lanka, and Zimbabwe had similar findings.

On numerous occasions when talking to prospective solar lantern customers, I was asked whether systems to power televisions were available. When visiting Sangilo primary school in Karonga, northern Malawi, for example, a teacher came purposefully over to me to ask for an appropriately sized system to power a television: "You know, teachers live in remote areas, they can't watch TV. These [panels for charging solar lanterns] are too small, but the ones at the schools [macro-solar panels] are too big." Another solar lantern customer, Mr William Sanudi at Citrefine estate in Malawi, said he was very happy with his solar lighting system but just wished he could use it for more applications like powering a television. Of course solar systems that can power televisions are readily available, including in most African countries, but the necessary size and complexity makes the retail price

a huge step-change from that of the pico-systems that can power lights and a radio. Quoting a rough price estimate to a solar lantern customer would generally result in a low whistle and a shake of the head in response.

The technical solution could be for a low voltage direct curent television set (i.e. one that does not require an expensive inverter) to be specifically designed for low-income rural customers and my interviews with the solar lantern manufacturers found that several[10] are already pursuing this. However, will it be hard to create a problematisation around lack of television access and successfully convert such solar television systems into humanitarian goods? For this to happen, the general acceptance of what constitutes a 'development problem' may need to expand. It is also interesting to ask at what point do we move away from conceptualisation as a humanitarian issue and simply focus in on mainstream consumer demand for standard domestic products? Presumably this can only occur when the need for buy-in from stakeholders in the international development sector reduces. The African mobile phone industry, for example, is now so profitable and sizeable that company marketing, such as websites, tends to focus entirely on mobile phones and related services as consumer products, leaving the humanitarian goods perspective tucked away on the corporate social responsibility (CSR) pages (e.g. Safaricom (2013), Airtel (2013)). This is despite a relatively recent history of development sector support for some aspects of their services, such as the funding provided by the UK Department for International Development (DFID) for Safaricom to develop and trial its mobile banking service M-PESA. However, this then became a fully commercial venture for Safaricom from 2006 (Hughes and Lonie, 2007).

Locally relevant technologies

Of course the need for clean energy products to be framed from a humanitarian perspective is just one aspect of the creation of meaning associated with them. Since the focus has now mostly shifted away from handing these types of products out for free to selling them to end-users, it is equally important that they are valued by end-users who will then be willing to exchange money for them. Creating relevance for potential customers is therefore a key component of the design process, as Akrich (1992) and Crewe and Harrison (1998) demonstrated in their analyses of products developed without end-user involvement. Recent successes, conversely, can be partly attributed to the intensive engagement of prospective end-users in design activities, illustrated in Cross' (2013) work on d.light solar lanterns.

[10] Organisation names kept confidential

There are several ways in which end-user engagement can occur, depending on the locality of design and manufacturing activities. Barefoot Power (Interview 14), for example, finds that their integrated supply chain[11] makes it easy to receive feedback from customers to input into their design iterations. One example is that earlier versions of their solar lantern system could charge mobile phones from the same panel that charged the light. However, they received feedback from customers saying they need to be able to charge the lantern battery during the day and plug their phone into the battery at night, since most people work during the day and have their phone with them. This was therefore incorporated into the next version of the system.

ToughStuff (Interview 17) equally obtained feedback from end-users via their sales network, but in their case through the NGOs that work to train and support solar entrepreneurs since they do not have integrated sales channels. The main difficulty they found with their first design of solar lantern was that it was not bright enough, particularly when compared with competitors. This was leading to fewer sales compared to other manufacturers' products, a clear manifestation of end-users' feedback. Their new design has therefore been doubled in brightness, from 10 lumens to 20. Obviously this feedback and acting on it is key to sustaining market growth, yet the more different organisations that lie between designers and end-users, the more complex and restricted the feedback channels become – such as in Malawi where SolarAid import and sell other products made by other organisations that have no direct presence in the country. This is where field trials and strengthening communication lines along the supply chain become increasingly important; without this Malawians have limited opportunity to have products tailored to their needs and desires. SolarAid staff stated that a specific reason for setting up a social impact and research function within the organisation was to be able to follow up with solar light users and get feedback on product usage, perceived benefits and suggestions for improvement. This is then communicated back to manufacturers, albeit in condensed form and further shaped by SunnyMoney requirements. Of course the designs are not only developed based on customer feedback, however, as there are many other factors like availability and cost of different materials, manufacturing techniques and so on.

Locally made products such as many types of efficient cookstoves facilitate a much more direct link between designer/manufacturer and end-user, and the fieldwork

[11] Barefoot directly trains local solar sellers in their countries of operation and has 21 customer service centres across Uganda alone (Interview 14)

with GVEP showed many examples of the energy entrepreneurs adapting and developing on the designs of efficient cookstoves and biomass briquettes they were originally trained to make. Sometimes this was in conjunction with the DEEP technical mentors deployed to support the entrepreneurs in their product development, but in many cases it was also entirely self-led initiatives.

One particularly innovative entrepreneur I was introduced to in Kenya was Patrick Mwenge (Photo 17). He had set up a briquettes business called Alfastar Industries with a strong focus on developing new types of briquette from different organic materials and new types of briquette making tools and machines. He had become a key collaborator with GVEP staff on finding new designs and providing increasingly efficient tools that could help other DEEP entrepreneurs. For example, GVEP staff used his premises for testing briquettes and collaborating to make a carbonation kiln design out of old oil drums.

Photo 17: Patrick Mwenge at Alfastar Industries in Nyeri, Kenya

In the majority of cases DEEP entrepreneurs had been trained to make a particular design of cookstove or briquette by GVEP, another entrepreneur or another NGO. However, five out of nine (56%) briquette makers I talked to had subsequently adapted the original design to suit their own resources, needs and customer demands, and similarly six out of 14 (43%) cookstove makers had also introduced

design adaptations. Further examples are given below (Box 1), with each change meaning a divergence of product form from the limited selection of designs initially introduced by GVEP and other NGOs.

Box 1: Examples of local adaptation of cookstove and briquette designs

Mr Herbert Bogezi, stove maker, Uganda. His original training was from an NGO in 2007, but he adapted the design of the portable stoves to have three doors instead of one so that users can regulate the heat produced – to cook quickly the user closes two of them, to cook slowly has all three open. Also instead of having sheet metal at the top of the stove for the pot to rest on, he changed to three hinges. These last much longer as the metal on top got spoilt quickly with the previous design. It also means the cladding can easily be removed for replacement of the liner and insulation. He had one cladding that had been used for 3 years, after which the customers brought it back to be fitted with a new liner. He is now looking to get UNBS (Ugandan National Bureau of Standards) certification so it may require further changes to meet the standard.

Farouk, stove maker, Uganda. After finishing school in 2006 he paid Ugastove (local family business with own design supported by GIZ) to train him in making stoves. The training was quite expensive but he saw it as good business opportunity. A German man from GIZ now comes to help him with the materials such as clay mix and designs. He has kept the same design he was trained in; Ugastove have changed their design a bit since (e.g. with door modifications) but he doesn't see these changes as necessary. However he has changed the mica ratio in liners in order to make them more durable. This was after Impact Carbon (who are obtaining carbon credits on his behalf) did a test to heat liners to 800ºC and put them in water to see if they break. They failed with the previous mica ratio so he changed it.

Mr Mawanda, briquette maker, Uganda. A former baker, he switched to charcoal dust briquette making in 1995 after training from an NGO. He had to change mix he was shown to use because the dust was making him ill, so now he adds water. After basic training in biochar making from another NGO he is collecting all types of local organic waste (see Photo 18) to add to his briquettes mix. He is working on what inputs work best and what ratio to mix with charcoal dust.

Photo 18: Mr Mawanda showing the organic matter he has collected locally in order to create biochar

Mr Edward Oliech Gwara, cookstove maker, Kenya. Previously mango grafting, he changed to cookstove making after training from Practical Action. Because he does not live near a market to buy sheet metal for making the cladding, he can only make liners and sell them to a cookstove assembler. He therefore designed his own cookstove made entirely from clay.

Photo 19: Edward Oliech Gwara in front of his house and his own design of clay cookstove

It is interesting to note the wide variety of reasons cited in Box 1 for inspiring these entrepreneur-led innovations, again clearly showing that end-user feedback is only one part of the story. Other influencing factors included:

- the need to increase durability for carbon credits application (Farouk);
- a general desire to improve flexibility and durability; taking it for testing to get certified with UNBS may lead to further changes (Bogezi);
- avoidance of health impacts of working with dry charcoal dust; to make use of free 'waste' products that should not be discarded and are available locally (Mawanda);
- the added value of being able to make the entire product (instead of only part of it) by developing a complete design that can be made with locally available materials (Gwara).

In many cases, rather than specifically getting feedback from customers who had purchased the product, improvements were made on the basis of the entrepreneurs themselves also being users of the products they make and therefore finding out their limitations themselves. This can negate the need for the complex laboratory tests and carefully designed field trials that tend to be used in the development of imported cookstoves and solar lanterns, yet are often inaccessible to the local entrepreneurs. It also means that there is not necessarily the clean separation between manufacturer and consumer depicted in the market maps: in reality these boundaries are blurred. Adding to this the external influence of NGOs, standards bureaus, carbon credit applications, locally available materials, health considerations and so on, the design of the products at any moment in time has emerged from a long history of interactions between people and materials.

Often the first design for a clean energy product for local manufacturing comes from external training, generally by development intermediaries, but the design may subsequently be modified at each new locality. The number of different designs in existence thus increases, and new versions might become more widespread as the designers start to give training to other people. Out of the 11 briquette and cookstove entrepreneurs found to have adapted their initial designs, eight of these (73%) said that they were training other people. Which designs are dominant in any place at any point in time is therefore determined by a whole complex array of factors. To help simplify this conceptually, some of those factors can be categorised as relating to innovation, transfer or continuity of output:

- Innovation activities: how people develop designs based on customer feedback and for other reasons

- Transfer activities: whether designs are transferred through training or copying and if standardisation tools are developed, e.g. to allow disaggregation of manufacturing (discussed later on)
- Continuity of output: whether certain designs continue to be manufactured or not, which in turn depends on sales success and other reasons for businesses continuing or otherwise

SolarAid's design for a locally assembled Kadzuwa solar lighting kit was available in Malawi until 2010 and offers a useful example. The first design introduced in Malawi was adapted after some customers complained to assemblers/sellers about the lack of light dispersal, so a technique of grinding the nib of the LED to disperse light was found. A second design iteration arose when the battery holders, originally made from locally available PVC pipe and paper clips, were found to be difficult to connect to the solar panels. Pre-manufactured battery holders were therefore imported and introduced to the design instead. However, rather than a linear progression of Kadzuwa designs being available in Malawi as these changes occurred, different groups of solar assemblers could be found making the different versions depending on when they had had their training and which materials (e.g. home-made or manufactured battery holders) were available to them. A third iteration also briefly existed when one end-user was seen to be using the end of a torch to cover the LED in order to further increase light dispersal, so SolarAid looked at implementing this as a more widespread design feature. It was never transferred, however, because no groups were trained in it before the whole programme was stopped. Once this had happened, with time all of the designs eventually ceased to be available because without support from SolarAid to secure materials there was no further continuity of output. Different designs of imported solar lanterns then started to become available instead as SunnyMoney became established.

Displaced technologies

As new technologies are developed and start to be circulated, other technological solutions to the same 'problems' can be made obsolete over time. The aim of many solar lantern manufacturers and distributors, for example, is to put the kerosene lantern out of use. However, as the quotation from Çalışkan and Callon (2009) at the start of this chapter highlights, nothing moves in a market unless it also holds value for the manufacturers and distributors. Kerosene lantern technology does not exist as a technology separate from human activity. Lanterns and their feedstock cannot

simply vanish without any impact on the people that interact with them, those that turn the technology and fuel into mobile market goods.

During a visit with SolarAid to collect marketing material in northern Malawi, the current fuel crisis had seriously reduced the availability of kerosene and inflated its prices where it was available. With most of the rural population still relying on kerosene for lighting and therefore being forced to spend increasing time searching for it and amounts of their limited income buying it, this was a situation that SolarAid was naturally keen to highlight. Mr Patrick Gondwe (Photo 20), a kerosene seller in a small local market, was approached and agreed to film a short interview about the 'problem' of kerosene. However, when the filming started he proceeded to explain the 'problem' of the increasing availability of solar lighting systems stealing his market and putting him out of business, and the knock-on effects this would have on his family. Of course he was politely thanked for his interview and we continued on our way to find other sources of marketing material to promote the problematic solar technology.

Photo 20: Mr Patrick Gondwe, kerosene seller in front of empty jerry cans in Hara Trading Centre, northern Malawi

Another example was a group of kerosene lantern makers living in the outskirts of Mzuzu in northern Malawi. Their parents were originally trained by missionaries from Zimbabwe who had presumably identified a 'problem' of limited income-generating opportunities, and similarly seen that people needed a cheap and accessible form of lighting. All of the local women wore white scarves and shirts as part of the religious affiliation also passed on by the same missionaries. The

particular woman we spoke to described how her mother had taught her to make lanterns, and that it was the only activity she had ever done to generate an income. Some members of the group also made metal cake tins and other artefacts from the same sheet steel used to make the lanterns. They sold their wares in their local neighbourhood and in town for 80 kwacha (around 15p/25c[12]) each. The women were very friendly and happy to tell us about their lantern business and let us take photos, yet I wonder if they realised that we were effectively hoping to put them out of business. It was comforting to know that they also made steel cooking implements, knowing that the market for those was safer.

Photo 21: Women demonstrating (left) and making (right) kerosene lanterns and cooking materials in Malawi

When GVEP set up DEEP, they initially recruited kerosene sellers in order to train them in selling other lighting options such as solar lanterns. This would have allowed them to diversify into solar if they saw that they were losing out to it. However, the international donors would not allow it and required the kerosene sellers to be dropped from the programme. Those people were associated with a dirty technology that the donors did not want to be seen supporting in any way, even if they would have had an existing network of energy customers who could then be exposed to solar technology. Charcoal makers were also initially asked to join the programme, with the intention of training them in biomass briquette making. Again, the donors insisted that they were excluded from the programme.

[12] Exchange rates used: £1 = 550 Malawian kwacha; £1 = US$1.67

Photo 22: Charcoal sellers in western Kenya

Inevitably any technology may displace another that serves the same purpose; it is a process that has occurred many times with resultant impacts on the market actors for the displaced technology. It might be argued that development intermediaries specifically aim to enhance people's livelihoods and should therefore support or at least acknowledge those that are negatively impacted by related marketisation activities. This is a point that is discussed further in Chapter 0.

6.2 Qualification and requalification

Standardisation

While the number of different designs of a particular product or solution to a 'problem' can theoretically be infinite, standardisation of particular aspects increase their utility and opportunities for successful marketisation. For example, solar lantern systems that charge mobile phones need to come with appropriately designed connectors that fit into the commonly available types of phone. Improved cookstoves need to be sized appropriately to take the common sizes of cooking pots. Equally, for modular manufacturing it is important that different parts fit together, even if made in different places.

The most prolific design of efficient cookstove for charcoal or briquettes in Kenya is now the Kenya Ceramic Jiko ('jiko' meaning cookstove in Swahili), commonly referred to as the KCJ. These can be made in any size the manufacturer chooses and indeed this is sometimes the case where one manufacturer is making the entire stove. However, a system of standard sizes has become common that has facilitated

growth of a market for liners only. Measured in inches, the liners range in diameter from 8 inches up to 12 inches. Each diameter of liner also has a relative height and thickness of clay. A key component of achieving this standardisation is the ability to measure. Although liner makers may not necessarily own a ruler, an essential tool for making liners is a mould (Photo 23, left) that turns out a specific size and consistent thickness of liner. The metalworkers that make these moulds are often also the stove cladding makers, so they know the standard sizes that are required. This simple factor allows cladding makers and liner makers to work separately while knowing that the different parts will still fit together. It is a significant contributor to the KCJ becoming one of the most prolific stove designs in East Africa. Liner makers in clay-rich areas, but without metal-working skills or sheet-metal sources, are able to sell their products to cladding makers and full stove assemblers in clay-poor areas, thus producing country-wide market assemblages.

Standardisation of products also makes sure that they all perform equally. It is very difficult to provide accurate performance information if every product sold is slightly different, even if only in subtle ways. One group of ladies making cookstove liners, for example, had started off arbitrarily putting air vent holes in the base of the liners, which is usual practise and what they had been trained to do. The air holes were at least all the same size because of a common tool used make them, but the pattern and number of them varied considerably. However, they subsequently realised that since the air holes affect the fuel burning process, it was making the efficiency and burn rate of every stove different. They therefore changed to a systematic number and arrangement of holes in order to ensure consistency (Photo 23, right).

Photo 23: Mr Herbert Bogezi in Wakiso, Uganda, showing different sized moulds for cookstove liners (left); improved cookstove liners with consistent number, arrangement and size of air holes (right)

The ability to standardise is heavily affected by access to measuring equipment or tools that are already made to standard sizes. In local artisan manufacturing, by comparison with advanced mechanised manufacturing, even basic tools needed for standardisation are not always available. For biomass briquettes, many briquette makers do not have weighing scales. Instead of selling by weight they instead sell by container size, such as a plastic bag, small bucket or large bucket. These containers obviously vary between sellers, however, making it difficult to accurately compare the price being offered by different sellers. Equally for GVEP trying to collate data on total briquette sales across DEEP, 'three bucket loads' is unhelpful information. Unfortunately when weighing scales are not readily available it is the only information provided and weight estimates for typical bucket loads have to be applied. Equally for the individual briquettes, where these are made by manual or automated machines it is easy for them to be produced in relatively consistent shapes and sizes. Where people are making them by hand due to lack of machinery, however, the shape and size will vary to a much greater extent and this will affect the burn time per briquette.

Testing, standards certification and patents – market devices with varying levels of accessibility

Beyond being able to recognise that a product in general will fulfil requirements, its specific capabilities need to be known more exactly so that people can accurately evaluate it and compare it to other possible solutions for the same need. Even a weighing system that can be described as a simple market device involves a much broader assemblage of human and non-human components than perhaps first envisaged: to be useful it must be of an appropriate design and calibrated at some point for accuracy, there must be a user with the necessary technique to use it in the correct way, a way of recording the weight for later reference is desirable, and so on, and all must eventually come together in a particular configuration at a precise moment of time for the act of weighing to be carried out. More complex market devices for evaluating product properties thus require almost inexhaustible lists of materials, tools and techniques. Figure 30 shows a flyer that a Kenyan solar lantern seller produced to advertise one of the lanterns it sells. As well as information on the electronic characteristics, such as Wattage and Voltage, and the materials it is made from, it provides very specific data about the light's performance in the following aspects:

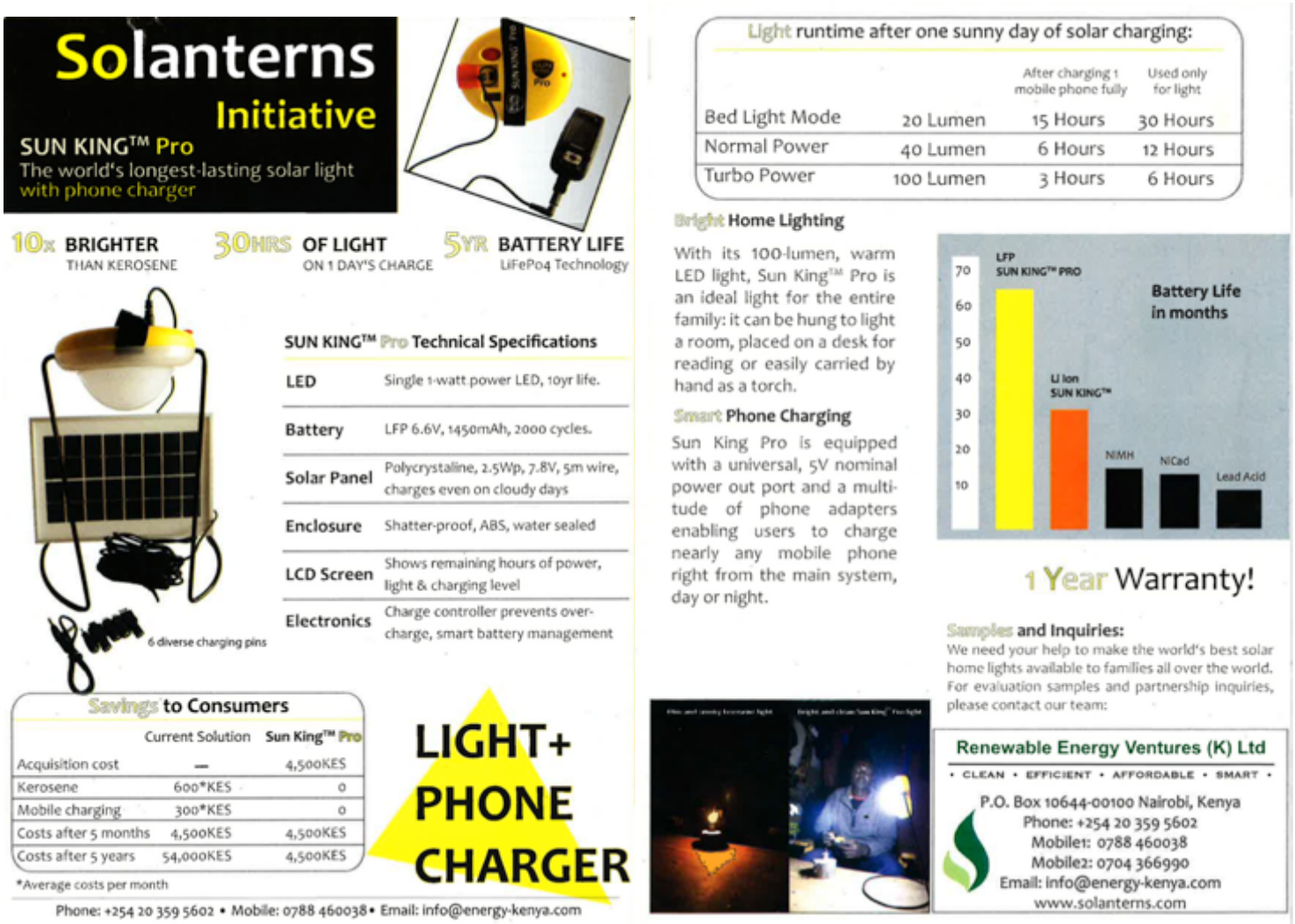
- intensity of the light it gives out, in lumens;
- length of time the light can be operated for in different modes, in combination or otherwise with mobile phone charging; and
- overall battery life, in months.

These characteristics are provided in both absolute and relative forms (i.e. in comparison to other lighting options). Verbal descriptions are also given summarising the product's uses and highlighting a 1-year warranty in case it does not meet the descriptions given. Similar information is also given on the packaging of the lighting kits themselves.

None of the performance values provided in such advertising materials or product packaging are immediately obvious from looking at the product alone. Establishing these values requires a vast complex system of laboratory and field tests, data collection over time, numerous measuring and recording devices, calibration equipment, testing protocols, trained staff, and so forth. This is not just for the product itself but also for those it is being compared with. It perhaps starts to highlight why SolarAid found that locally assembled solar lanterns were unable to compete with the imported products that emerge from these complex systems to

ensure standardised, quality products and that come complete with such detailed evaluative information.

Figure 30: Kenyan flyer about SunKing Pro solar lanterns



Many of the energy product sellers interviewed (e.g. WEDI, Interview 4; Up Energy, Interview 12) had found that customers were willing to make a purchase if they could see that a product was good quality. For local manufacturers it was therefore important to find ways of creating high quality and aesthetically-pleasing products as far as possible, even if the more complex market devices of advanced manufacturing and testing processes were inaccessible. GVEP trains its entrepreneurs in improving the visual appearance of their products, promoting packaging and labelling to give a professional appearance. It also links them with local testing facilities where available, such as for cookstoves at the Centre for Research in Energy and Energy Conservation at the University of Makerere in Kampala, Uganda. Where this was not possible, in some cases entrepreneurs undertook their own qualification processes. For example, cookstove seller Naaman Justus in Mombasa said that he had undertaken his own research in order to inform his customers, and found that improved cookstoves made a bag of charcoal last 15 days longer than a standard metal one (45 days instead of 30).

Photo 24: Painted and labelled cookstove made by Farouk, Kampala

The consumer's experience of the technology will also be highly dependent on them understanding how it works and how to use it optimally. A solar lantern is not inherently a provider of light; instead, it must be used by someone with the cognitive understanding of how it works who then applies that understanding to use it. As well as DEEP entrepreneurs and SunnyMoney sellers being trained to give as much information as possible to their customers, some product manufacturers provide instruction sheets and/or instructions written into the product or its packaging. These instruction sheets and labels are vital channels of communication between the designer and the user. They combine with the product to enhance its

potential and value. Simple ways of promoting that communication line, such as making sure instructions are in the local language or clearly embedded into the product (Photo 25), can therefore add considerable value.

Photo 25: d.light solar lantern with embedded instructions

Quality can also be demonstrated more systematically through a quality assurance scheme. For solar lights that are imported, they are theoretically checked for quality by customs and have to meet the standards required by the national bureau of standards. These are generally in line with international standards for the specific product in question. The Malawi Bureau of Standards (MBS) describes the process as follows:

> All importers of designated products […] are required to register with the MBS on the scheme. The designated products list is based on published mandatory Malawi standards. Pre-shipment samples of potential imports are demanded by the MBS from the manufacturer in the countries of origin for the MBS to ascertain compliance to respective Malawi Standards of the product before the consignment is allowed to depart the country of origin for Malawi. Consignments of products for registered importers are then quickly checked at the border point for compliance to the relevant Malawi standard, before they are cleared. A letter is then issued to MRA [Malawi Revenue Authority] indicating compliance or non-compliance of the consignment for clearance purposes. (Malawi Bureau of Standards, Date unknown)

Although this system appears a good start, interviews with solar home system sellers in Kenya (Kenital Solar, Interview 24; Sollatek, Interview 26) found that a similar set-up in Kenya has been problematic in terms of enforcement. Perhaps

unsurprisingly, it was suggested that if people really wanted to import something, there were ways of bypassing the quality requirements or even customs altogether. An example was known where someone selling Sharp photocopiers had bought lots of sub-standard solar panels in to the country and put the Sharp stickers on them. In other cases the stickers showing panel wattage had been swapped or added subsequent to import, showing a much higher wattage than the panel actual had – such as a 20W panel being rebranded at 40W. The standards system for imported solar panels was introduced in 1999, however, and since then various improvements to make some of these activities more difficult had been observed. After legitimate solar importers pointed it out, the import legislation was changed to make sure that sizing stickers are embedded in the panel underneath the glass so that they cannot be removed or changed. The limitations of the system more generally are still widely recognised though. One solar lantern importer noted that despite all of their products having met the required standards of the Ugandan National Bureau of Standards (UNBS), they deliberately did not put UNBS stickers on them: "as other products we know are no good still have UNBS stickers – so we don't feel it's necessary or useful to put stickers on ours." (Village Energy, Interview 21, 2012)

Since state enforcement of quality standards for solar lighting products may be perceived to have weaknesses or have not yet been established in some countries, the quasi-World Bank organisation Lighting Africa has been setting up a non-state framework for solar lighting kit quality assurance. It is often used by development intermediaries involved in distributing solar lanterns in order to have confidence in the products they choose to deal with. This in turn encourages manufacturers such as Barefoot and d.light (Interviews 14 and 29) to engage with the system.

No solar customers who I talked to knew of Lighting Africa or had used it to gain information on the quality of potential purchases. However, adherence to Lighting Africa standards was advertised on some locally-made marketing materials for solar products in Kenya (Figure 31, left) so that it may become more known of over time. In general, engagement with final customers during this research was too limited to be conclusive, but from those talked with and from conversations with local manufacturers (cookstove makers only) the significance of products having met national quality standards seemed to be variable for individual buyers. By contrast, for larger wholesale buyers (e.g. supermarkets) it was often a requirement for any products they bought. The advertising materials shown in Figure 31 are perhaps overly-optimistic of the wider knowledge of specific quality frameworks. However, the official-sounding and positive language used, extensive list of standards adhered to (right-hand example) and mention of associated international

institutions (IFC and World Bank in left-hand example) undoubtedly increase the impact made.

Figure 31: Quality assurance indications on solar lantern advertising materials

For locally-made products such as cookstoves and briquettes, certification with the national standards bureau is sometimes also available (although not always easily accessible) but is not mandatory. The only time it might be required is when selling to large distributors who have incorporated national standards into their purchasing policy. Some cookstove makers in Kenya, for example, had gained KEBS (Kenyan Bureau of Standards) certification in order to sell to supermarket chains. They found that being able to put the KEBS logo on their stoves had also improved consumer trust more generally and allowed them to put the price up due to the improved quality it represented compared to competitors. This also helped cover the monthly fees needed to be paid to maintain the KEBS certification and the initial costs of carrying out of the required tests.

Some issues were identified with the standards required, however. For example, one entrepreneur (Farouk) failed to achieve certification for his cookstove under the UNBS framework as the standard was only relevant for one specific design. This was for a 3-stand stove that rested on 3 metal legs attached to the bottom of the stove. However, Farouk's experience was that this design is not strong enough for making 'posho' on, the maizemeal that is the main staple of Ugandan meals and requires vigorous mixing. He therefore makes flat-bottomed stoves and is unwilling to change this design to meet the UNBS standard when it would in fact reduce the functionality of the stoves. The standard therefore has very restricted application and in fact restricts the potential for innovation.

The Kenyan standard for improved stoves is entitled KS 1814-1:2005 and sets minimum standards for their performance. It is applied in combination with international guidelines for evaluating cookstove performance, ICS 97.040.20. Testing to these standards often requires very advanced facilities with suitably trained laboratory staff and authorisation to undertake certifications, all further socio-technical components needed to complete the market device. However, such facilities are not necessarily readily available locally. Associated with the standard is

an amendment to the Energy Law that was being developed in Kenya in 2013 to require people importing, manufacturing, distributing, and/or installing improved cookstoves to be registered as such. Registration involves an application process and declaration that only stoves meeting the standard will be handled (Authority of the Republic of Kenya, 2013). It will be interesting to see how this is enforced for the large array of small-scale producers currently in existence in Kenya.

For cookstoves that can also be subject to large-scale fully automated manufacturing abroad and then imported, the testing standards are being developed even further and becoming increasingly inaccessible for local artisan cookstove makers. Colorado State University Engines and Energy Conversion Lab, for example, is developing advanced durability testing with automated testing rigs as part of their product development. They are also working with the US-based Global Clean Cookstove Alliance to develop an associated testing protocol, in turn leading to a laboratory standard for rating cookstove durability (Colorado State University, 2013). The complex and extensive socio-technical arrangements needed for such market devices, however, makes them unavailable in many countries and inevitably leads to power asymmetries between local artisans and increasingly 'macro' market actors such as those involved in advanced cookstove design in US institutions, despite their apparently similar market roles.

Although briquette-makers have limited competition from international manufacturers, Patrick Mwenge in Kenya encountered a problem when a large-volume buyer of his briquettes asked him to obtain a KEBS standard: one has not yet been developed. He therefore had to subject his briquettes to the same tests required by the relevant South African standard. The briquettes failed, yet the tests were unrealistically stringent for the much less developed Kenyan briquette market. GVEP staff had heard that the Kenya Industrial Research and Development Institute was developing a Kenyan standard, but no further information was found.

As a designer and maker of briquetting machines, Patrick also considered patenting his designs. However, he felt that the process was too onerous in terms of both administrative requirements and costs. Without the protection of patenting, he found that people often copied his machines, although he stated that since he was always improving his design he was in fact not as concerned about it as he had initially expected. Again, patenting is an inaccessible market device for many local innovators. Ability to obtain patents increases the power of those organisations relative to other market actors. Here, however, trading within the 'informal economy' does offer advantages through the lack of adherence to formal regulation.

One cookstove entrepreneur, for example, described how he would look for 'patented' cookstove designs on the internet that he could copy. Furthermore, the limited complexity and rapid advancements of designs and manufacturing processes in these contexts perhaps makes patenting less relevant by comparison with hi-tech industries.

6.3 Valuation and price-setting

Attaching a value to an object transforms it into an 'economic good' for exchange. Valuation by international development stakeholders is heavily linked to the problematisation described at the start of this chapter. For end-users, however, it is linked to various factors associated with purchase and use, and how the available alternatives compare; hence the importance of the qualification processes described above. In idealised economic terms, people weigh up the immediate cost of a product against the savings it will incur in the longer term and undertake a cost-benefit analysis. However, even where the performance of products can be measured 'scientifically' and presented to potential consumers alongside comparative data for competing solutions, their valuation will be a much more complex and unique process that leads to a different value being ascribed to the same product by every potential end-user.

Valuation embodies wide desires, influences and experiences. For example, in many rural areas of the three countries I worked in, there seemed to be a strong desire to emulate the 'modern' ways of life seen in urban areas. Attaching modern as a meaning to products is seen as very positive. One person talked about his grandmother getting a large solar panel for her rural home, bought for her by her children who saw the danger of her using candles: "She got a TV and radio with it. She was so impressed; she saw life was joyful with it. It was in the village but life became more like in the town." This had inspired him to set up his solar phone charging business. There was similarly higher value put on externally manufactured cookstoves versus locally-made ones.

Value is also associated to prior experience, even where it may have no direct link to the specific product in question. People were sometimes mistrustful of solar because of having experienced directly, or having heard of, a solar product malfunctioning. Equally I saw various examples of a mistrust and lack of value associated with Chinese-made products. This is seen in people willing to spend as much or more money on second hand European clothes in the large marketplaces specifically dedicated to selling them, than brand-new clothes imported directly from China.

One solar manufacturer commented on the difficulty of persuading people that even though the solar lanterns are manufactured in China, they are designed in Australia and meet international quality standards.

The development intermediaries promoting clean energy products recognise that customers are interested in a variety of factors related to the product, and not necessarily the same features that development stakeholders are interested in. In order to encourage the valuation process, they have developed a variety of advertising materials that highlight benefits of the products being promoted (Figure 32 and Figure 33). These tend to focus on monetary value (particularly versus competing products), health and safety aspects, and diversity of applications.

Figure 32: Flyers for solar lanterns by GVEP (left) and Solar Sister (right)

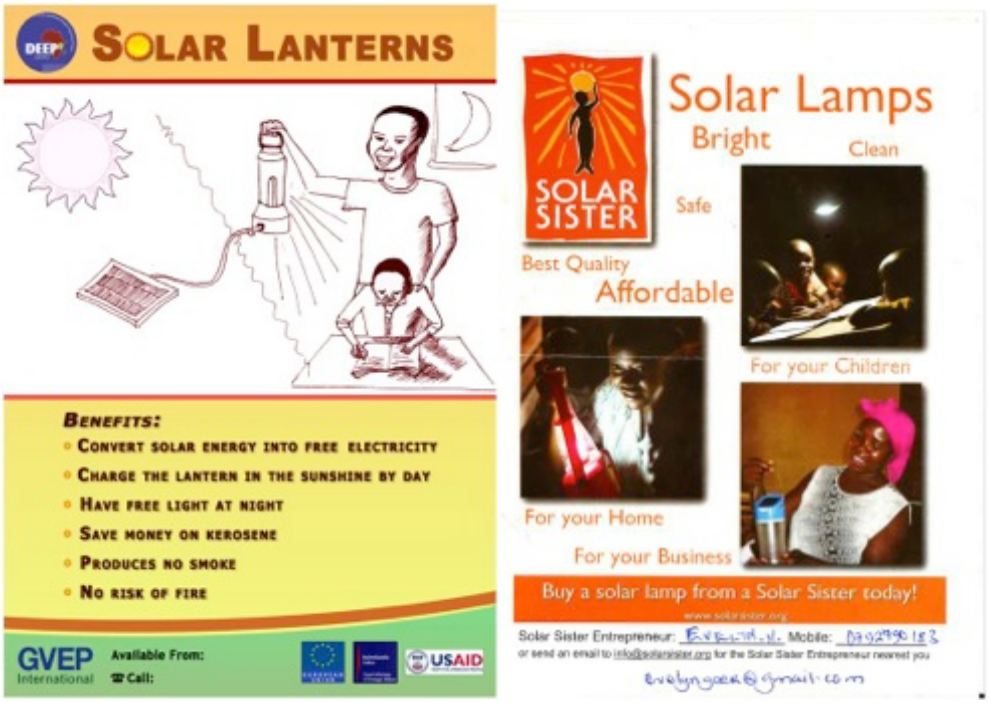


Figure 33: Flyers for improved cookstoves by GVEP (left) and GIZ (right)

As well as written descriptions of the products, all of the advertising material includes drawings or photos of them and in most cases people using them. The representations of end-users all have happy, smiling faces that entice the prospective consumers to visualise themselves in idealised situations such as pristine smoke-less kitchens or a well-lit sitting room where their child reads a book.

The flyers attach these lifestyles to the products, providing not just a useful description but performing the readers as users of the products. Related to this, a member of staff observed of the GVEP flyers that they offered limited portrayal of the 'modern' and sophisticated lifestyle that were known to appeal to potential customers.

Direct health impacts, such as reduced smoke and no fire risk, are clearly values perceived as shared across end-users and development stakeholders. By contrast, across the marketing material there is limited explanation of wider environmental benefits – unlike development-related literature for the same products, which focuses extensively on the problems of climate change and deforestation. Further research would be needed to determine if this is only a perceived difference or a reality. Certainly some DEEP entrepreneurs claimed that their involvement in these markets was motivated by environmental concerns and deliberately communicated environmental benefits to their customers. In Kenya I helped to promote GVEP's work at a national climate change 'expo'[13] and talked to other exhibitors, purposeful visitors and others that had just been 'passing by'. I was impressed by the level of awareness of climate change issues and related concern amongst Kenyans, with much higher levels of engagement than I have generally experienced in the UK. This is perhaps unsurprising given recent episodes of drought in the Horn of Africa and flooding in Kenya, with widespread adverse impacts on vulnerable communities. Numerous representatives from Kenyan civil society organisations were there to circulate petitions calling for a strong agreement at the forthcoming international climate change negotiations in Durban.

Interestingly, a ToughStuff poster was also seen on display in one solar lantern seller's kiosk. It showed photos of the products but did not describe the various benefits specifically, instead simply summarising its inherent value by suggesting: "Use ToughStuff Solar products to improve your life".

Warranties

Part of the valuation process of a product involves considering the length of time for which it will be able to serve its intended purpose. Unsurprisingly, there is little reference in the marketing material to the fact that these products, and components thereof such as batteries, have a limited lifespan. Partly to give prospective consumers confidence that their new purchase will perform as advertised for at least a minimum duration (and partly for other reasons discussed in the carbon finance

[13] Kenya National Climate Change Expo, Kenyatta International Conference Centre (KICC), Nairobi, 13th – 15th October 2011

section later), most solar lanterns and cookstoves imported by development intermediaries are distributed with warranty certificates.

All of the products sold by SunnyMoney, for example, are sold with a piece of paper or card in the packaging that describes an after-sales service promise from the absent manufacturer to the buyer, in the form of a list of legal terms and conditions of their mutual obligations written in English. An example from a Barefoot Firefly solar lantern is shown in Figure 34. However, these are a contract with the manufacturer that has no physical presence in Malawi, except via SunnyMoney as importer, and represent only part of a larger market device. They only become more than a passive piece of card if they exist alongside the full human and material capacity to fulfil them.

Figure 34: Warranty card for Barefoot Power solar lantern

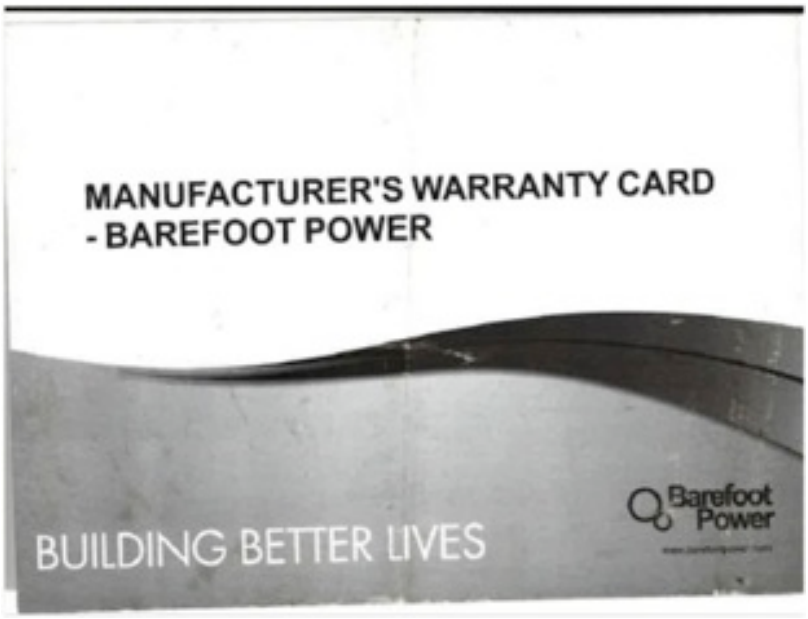
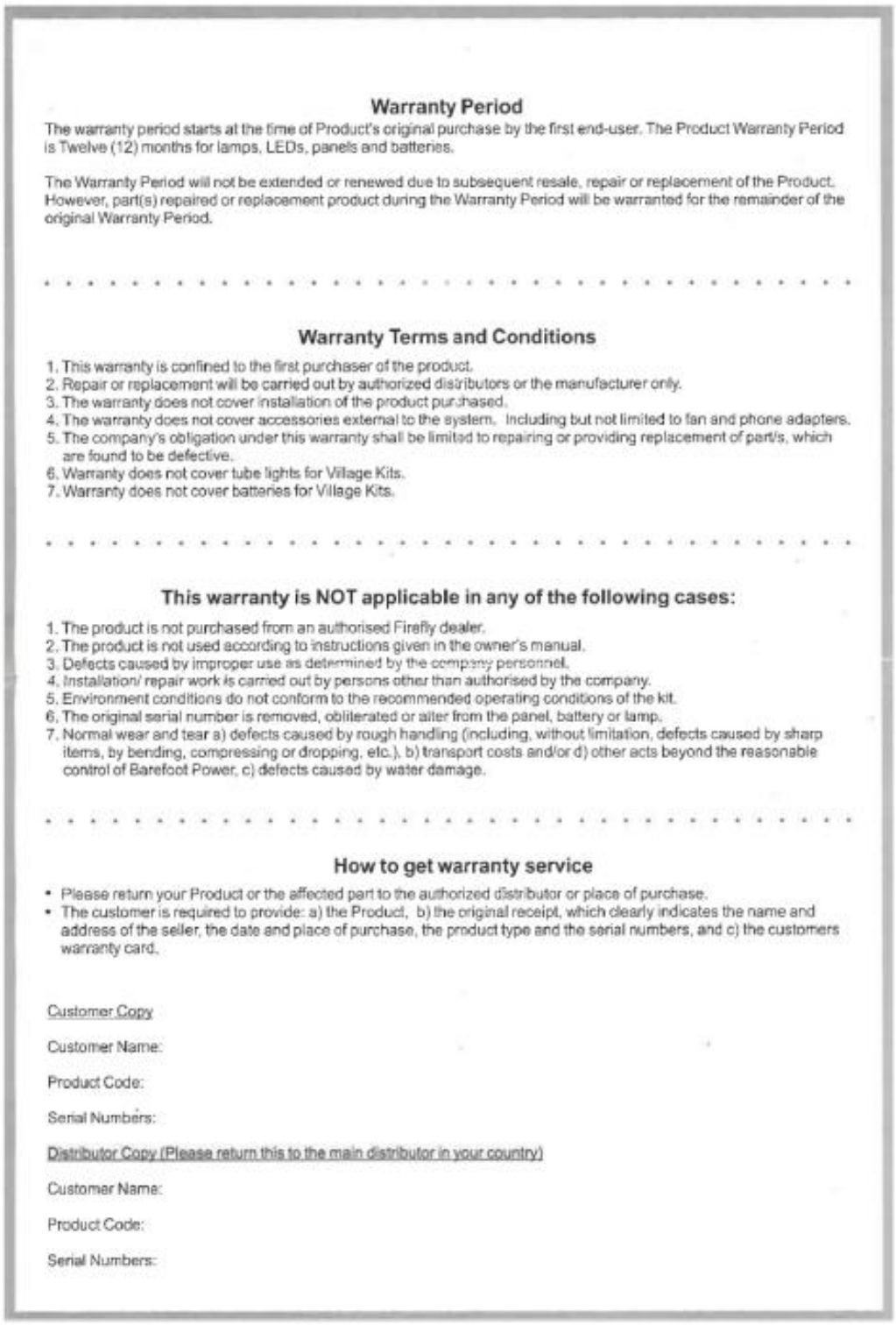


Figure 35: Inside warranty card for Barefoot Power solar lantern



Warranty Period

The warranty period starts at the time of Product's original purchase by the first end-user. The Product Warranty Period is Twelve (12) months for lamps, LEDs, panels and batteries.

The Warranty Period will not be extended or renewed due to subsequent resale, repair or replacement of the Product. However, part(s) repaired or replacement product during the Warranty Period will be warranted for the remainder of the original Warranty Period.

Warranty Terms and Conditions

1. This warranty is confined to the first purchaser of the product.
2. Repair or replacement will be carried out by authorized distributors or the manufacturer only.
3. The warranty does not cover installation of the product purchased.
4. The warranty does not cover accessories external to the system. Including but not limited to fan and phone adapters.
5. The company's obligation under this warranty shall be limited to repairing or providing replacement of part/s, which are found to be defective.
6. Warranty does not cover tube lights for Village Kits.
7. Warranty does not cover batteries for Village Kits.

This warranty is NOT applicable in any of the following cases:

1. The product is not purchased from an authorised Firefly dealer.
2. The product is not used according to instructions given in the owner's manual.
3. Defects caused by improper use as determined by the company personnel.
4. Installation/ repair work is carried out by persons other than authorised by the company.
5. Environment conditions do not conform to the recommended operating conditions of the kit.
6. The original serial number is removed, obliterated or alter from the panel, battery or lamp.
7. Normal wear and tear a) defects caused by rough handling (including, without limitation, defects caused by sharp items, by bending, compressing or dropping, etc.), b) transport costs and/or d) other acts beyond the reasonable control of Barefoot Power, c) defects caused by water damage.

How to get warranty service

- Please return your Product or the affected part to the authorized distributor or place of purchase.
- The customer is required to provide: a) the Product, b) the original receipt, which clearly indicates the name and address of the seller, the date and place of purchase, the product type and the serial numbers, and c) the customers warranty card.

Customer Copy

Customer Name:

Product Code:

Serial Numbers:

Distributor Copy (Please return this to the main distributor in your country)

Customer Name:

Product Code:

Serial Numbers:

One of the first challenges to the successful operation of the warranty market device is that in order to validate a warranty, customers need to prove the date of purchase. Initially SunnyMoney provided their entrepreneurs and dealers with receipt books for this purpose, a pad of specially marked papers with differently coloured carbon copies for each, but since the start of 2012 it was decided that the cost and

responsibility of providing receipts should lie with the sales people. Operating with varying levels of formality, many have not continued this. Increasing numbers of problematic products were being filtered back to SunnyMoney's Mzuzu office, without indication of whether they were still bound by the theoretical warranty contract. If giving the date of purchase for a time-bound warranty becomes trust-based, it arguably negates the whole purpose of introducing a physical paper-printed warranty to formalise the agreement in the first place.

At the same time, the manufacturers whose products SunnyMoney import do not yet offer a service of providing replacement parts, only full replacement of faulty products once they are sent back. SunnyMoney are stifled in their efforts to develop capacity to mend faulty products or equip the actors in their sales networks with spare parts. For the most vocal or significant customers, the easiest or sometimes only option is to provide a brand new replacement product, depleting SunnyMoney's stock while the manufacturer is informed and asked to send extra products to fulfil their side of the warranty promise in the next consignment, up to six months away.

Other broken products stay with dissatisfied customers who are not aware of the rights that their warranty certificate apparently gives them. Even where a customer can read these promises written in English, they have no way of proving that the warranty period has not expired yet and limited ability to make a claim against the warranty in any case. Their supposed humanitarian good sits uselessly in the meantime, bereft of its ability to perform as such. The concept of a warranty, developed for very different looking markets, does not seem as well suited to the rural African context. Firstly there may be a long sales chain to go back through (Figure 36), often with extensive geographical distances between each actor that take significant time and money to deliver a product back across, with no available recompense; a solar lantern cannot simply be posted back to the shop in prepaid packaging.

Figure 36: Example of solar lantern sales chain along which warranty promise is made

Furthermore, in Malawi and other African countries there is often limited history of warranty systems, perhaps because of the predominance of informal market exchanges. In northern Malawi we interviewed 47 market traders and only 7 (just under 15%) said that they offered anything similar to a warranty whereby they

would replace an item if it came back to them damaged. One of those commented, however, that no one did ever come back with a problem and if they did it was bad luck that the manufacturer had made a bad product, not the responsibility of the stockist. Customers would be more likely to accept the problem as entirely separate from the product sale and find a way to fix the issue themselves.

In essence, market devices such as warranties are stifled in this context by a hybrid system of formal contracts and informal sales, and limited opportunity for actors to know or fulfil their sides of optimistically worded contracts. If the marketisation approach aims to create a functioning formal market system with effective market devices, and thus gain the trust of customers so that they and their networks are enticed to participate in the new market over the long term, it is still a work in progress. What appears particularly problematic in the example of SunnyMoney is that the manufacturers have already incorporated the value of the warranty device into their price setting calculations, yet that value is rarely getting experienced by the end-users and is unlikely to be considered in their own valuations. In essence they are forced to pay for an aspect of the product that they cannot easily benefit from, creating a power asymmetry in favour of the manufacturer during the market exchange. Although it is a system that may work well in places such as Uganda (where Barefoot had 21 service centres at the time of writing), in Malawi there were undoubtedly better solutions. Photo 26, for example, shows local repair people in northern Malawi demonstrating that they already had the skills to fix faulty solar lanterns.

Photo 26: Local radio (left) and mobile phone (right) repair people demonstrating that they can mend faulty solar lanterns

Price setting

In order for a market exchange to take place, value is quantified in monetary terms. Ultimately a price is established through negotiation, which can vary in its visibility, between buyers and sellers. Both sides will be equipped with their valuation, discussed above, and with various calculative devices, named 'valorimeters' by Çalışkan and Callon (2010), which can help turn that valuation into a price. On the seller side, the simplest 'valorimeter' is "the gold strategy of marking up" (ibid., p.18) whereby the price of a product is based on the cumulative price of raw materials plus overheads (such as labour, transport) and a suitable profit margin. This is discussed further in the next chapter in the context of the price setting processes of the 'local entrepreneurs.'

Price setting is affected by a seller's knowledge of price setting techniques and their cognitive and technical ability to apply them; for example, poor record keeping can make it difficult for an artisan manufacturer to know the actual cost of input materials. Additional costs such as payment for quality testing and registration with a standards board also feed into the seller's price, whether or not a buyer takes any notice of that standard when doing their own valuation. As discussed above, a warranty system is similarly incorporated into a price even if a buyer cannot utilise it. Formalising a business and complying with regulations also involves expenses, leading to cost advantages for products made in informal conditions.

The seller's price is then adjusted when other factors are taken into consideration, including the social interaction at the point of exchange where negotiation occurs. One solar powered barber in Uganda described his prices as: "1500 [Ugandan shillings] per person, or if they complain a lot they might get it for 1000." As a seller of solar lanterns, SunnyMoney staff have frequent and extensive management meetings about pricing structures that follow a similar basic pattern of 'costs plus profits'. As a larger, more formal seller, however, they try to be less swayed by individual negotiations and follow set rules about the prices offered to different types of buyers. Since they are the only importers of many types of solar lanterns into Malawi, they have relative power to fix prices at their desired level.

Where price-setting starts to divert significantly from the materiality of products it can cause difficulties in the overall marketisation process. The existence of subsidies, grants and carbon credits for environmentally friendly 'humanitarian goods', for example, can cause the price set by sellers to deviate significantly from the calculated value of a product, as discussed further below and in Chapter 0. The price may be set by means detached from the production of the goods, such as

'willingness to pay' studies. They could also become distortedly low, or non-existent in the case of free allocation, removing the buyer's opportunity of being involved in the conversion of value into price and choosing their actions on this basis, and diminishing the opportunity for other market actors to sell competing products.

On the buyer-side, cash availability was seen as a significant determinant of purchasing decisions in the contexts analysed in this research. Solar lantern sellers, for example, found that visiting areas just after the local harvest time when people had cash in hand was most profitable, with people more readily agreeing to buy at the first price proposed. External influences such as prices of competing products again affect the buyer's price-setting processes. The competition for solar phone charging, for example, is grid charging and as one provider stated: "The price is 500 [Ugandan] shillings for 2.5 hours of charging. That's the same as people charging from the grid. It's the standard price, people would complain if it gets increased." A briquette seller in Kampala struggling to find buyers at the price they needed to cover operational costs suggested that: "One of the things that is missing in Uganda is regulation of charcoal to make it higher cost relative to briquettes." (Green BioEnergy, Interview 16, 2012)

Another classic 'valorimeter' is cost-benefit analysis: customers ideally consider what they will be replacing and how they value the new product by comparison. Here cookstoves and briquettes are at a disadvantage compared to solar because they are often replacing something that is, in monetary terms at least, freely available – stones and firewood. Although there may be health impacts and deforestation issues, numerous people in rural African settings are accustomed to using open fires and would not necessarily prioritise paying for a stove instead. Someone trained in economic tools, however, might be able to use long-term cost-benefit analysis to demonstrate that the future costs to a family of significant health problems from smoke inhalation in fact outweigh the initial cost of an efficient cookstove. Since they also reduce the amount of firewood needing collection, further savings are made if the economic value of their time is considered. At a much greater stretch, the potential cost of damage caused by climatic changes that the deforestation could contribute to can even be incorporated into the calculation.

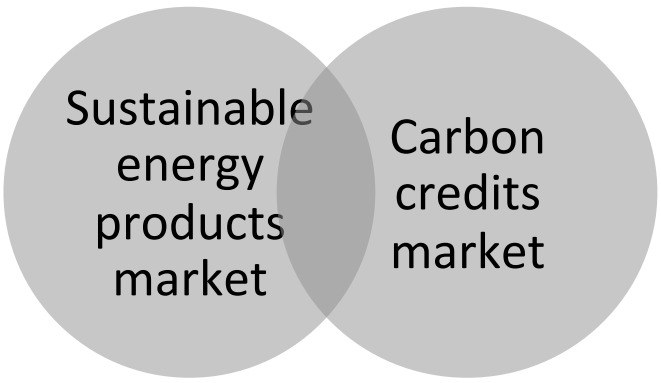
Perhaps unsurprisingly, application of these types of extensive calculations by potential customers were not observed. It might be argued that low numeracy levels and low education levels more generally make such cognitive tools inaccessible. For example, many solar lantern sellers stated that they find it difficult to persuade people that the high up-front cost of the system is worth it based on the savings

made over time. Although kerosene is relatively cheap to buy at the time of purchase, once successive daily or weekly purchases are added up it eventually becomes an increasingly expensive option by comparison with the one-off purchase of a solar lantern. Difficulty in explaining this to potential customers is explained by sellers as the customers' limited understanding of cost-benefit analysis and 'pay-back'. However, it could also be argued that these are idealised tools for someone who has both adequate market information and, perhaps more importantly, the ability to pay for a more expensive product that only becomes cost-effective over the longer-term. Limited access to the necessary funds to buy the solar lantern in the first place, due to prioritisation of more directly obvious needs, can make certain 'valorimeters' irrelevant or a luxury at best. The ability to fully render people into rational 'economic' actors is essentially limited. This is why emerging products such as pay-as-you-go solar (discussed further in Chapter 0) may be highly significant, even if the users have to pay higher overall costs for the same system in the long-term.

6.4 Carbon finance

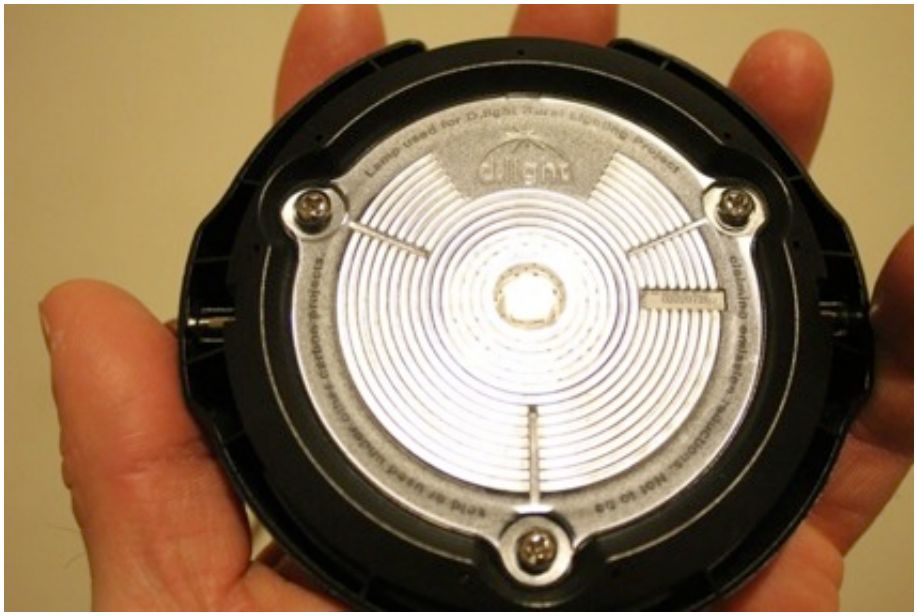
Another aspect of the kerosene problematisation that is used to garner wider support for solar lighting technology is the climate change perspective. Again, this can be used to appeal to environmentally-conscious donors, investors or consumers. It also, importantly, is required in order to benefit from a specific type of revenue stream for projects to distribute solar lights: revenue from the sale of carbon credits. Greenhouse gas emissions have been 'marketised' so that price-setting for products which also generate carbon credits depend in turn on the inter-relation between the value of the original product and the value of the carbon credit, which is about to embark on its own journey of exchange within a market system.

Figure 37: The exchange and use of sustainable energy products interlinks with the production and exchange of carbon credits



SolarAid advertise carbon savings as one of the benefits of solar lamps on their website, as shown in Figure 29 above. However, at the time of the research they were not in the process of collecting 'carbon credits'. In 2008 SolarAid had registered its Malawi SunnyMoney operations as a Gold Standard voluntary market carbon project, specifying that 39,000 1.8W solar lighting kits would be sold and used to replace kerosene lanterns, leading to a total reduction of 1,901.72 tonnes of CO_2 equivalent per year for a period of 10 years (SolarAid, 2008). However, this was based on locally assembled solar lamps, and since moving to imported lanterns SolarAid had acquired the complication of the lantern manufacturers potentially already claiming carbon credits for the same lanterns. Photo 27 shows a d.light S1 solar lantern, a key SunnyMoney tool for their schools marketing campaigns, with the following carbon credit statement printed in to the plastic cover of the light: "Lamp used for d.light Rural Lighting Project claiming emission reductions. Not to be sold or used under other carbon projects."

Photo 27: D.light S1 solar lantern with carbon credit statement



This statement is used to indicate that d.light already uses the quantified carbon reductions to sell as carbon credits and help finance their products. They also link the carbon reduction aspects of their products with their social benefits marketing, putting a specific number on the extent to which they are helping to protect the environment through avoidance of greenhouse gases.

The d.light website provides a statement of the current levels of reductions achieved. On 2nd July 2013, for example, it stated "1,047,505 tons of CO_2 offset" (d.light design, 2013). There are several reasons that this is a particularly interesting statement.

Firstly, the level of known accuracy it suggests is surprising. This also applies to the figure of 1,901.72 tonnes of CO_2 equivalent per year that were the calculated reductions for the original SolarAid Gold Standard carbon project. For carbon finance calculations, an exact number of tons of CO_2 must be estimated as this will define the number of carbon credits awarded as 'certified emission reductions' (CERs). However, there is a whole host of estimations and calculations undertaken to achieve this figure, discussed to some extent below, that make the error margins of such calculations very high. The calculation tends to be 'black-boxed,' to use Latour's term, leading those who cannot see inside it to assume that the figure produced is a cold, stable piece of information.

Secondly, d.light's statement could be seen as misleading due to the confusing use of 'offset'. If the carbon credits 'generated' by the lanterns are all sold, those buying the credits are buying the opportunity to emit the equivalent amount of CO_2 at the buyer end and state their overall 'carbon neutrality'. The net result of the carbon reductions being sold as offsets, therefore, is zero reduction in CO_2 emissions overall. Theoretically d.light has not 'offset' any CO_2 as their statement suggests, they have only enabled buyers of the offsets to produce the equivalent volume of CO_2. This situation, however, has become inaccessible to most lay people, again because of the way that carbon market processes have been 'black-boxed'.

Standardisation and accessibility

As well as excluding the readers of 'impact' statements on websites, the system of generating carbon credits has become so complex that it is also inaccessible to many potential participants. Chapter 2 describes how Africa as a region has historically had limited participation in the Clean Development Mechanism (CDM) and slightly higher representation in the voluntary mechanisms. Where projects are registered, however, they tend to be above a certain size and have involved an organisation with some expert knowledge in the carbon markets. For GVEP, most of their DEEP entrepreneurs have not heard of carbon credits and even where they have, do not have the necessary expert knowledge to actually develop a carbon finance project. Only two out of the 30 (7%) I spoke to mentioned carbon credits at all and just one had been able to access them via a different NGO's project. Furthermore, the DEEP entrepreneurs tend to manufacture and sell products in far too small quantities to be able to benefit from the carbon markets on their own. The transaction costs of registering a project, obtaining credits and organising their sale are high and need to be outweighed by the volume of credits obtained.

Even for a large company like d.light, the costs are huge. Cross (2013) states that: "The project registration process involving third party assessment, validation and certification is extremely expensive and bureaucratic, and it took d.light design 18 months at an estimated cost of US$500,000." (p.382) However, it can still be worth it financially: "Over the first two years, the project stood to displace some 80,177 tons of CO_2. With each ton trading at an average price of US$15 between 2009 and 2010, d.light design was set to raise around US$1.2 million" (ibid., p.383).

Although local sellers of imported solar lanterns may be excluded from the carbon markets due to manufacturers already claiming credits, as in the d.light example, in principle the benefit still trickles down through the retail price of the lanterns being lowered by this extra income stream. Where there appears to be a more problematic exclusion is where individuals or groups such as DEEP entrepreneurs are themselves manufacturing and selling 'low carbon' products, such as clean cookstoves, yet are unable to compete with larger manufacturers or project developers. Unlike the local artisans, those larger actor-networks embody the technical, cognitive and financial capacity to access complex and high cost carbon finance mechanisms. A specific example of the distorted competition this leads to is given in Chapter 0 (Section 8.7).

My fieldwork period coincided with the 15th Conference of the Parties (COP 15) to the United Nations Framework Convention on Climate Change (UNFCCC) in Durban; since the University of Edinburgh has 'observer' status I was able to attend. Having the COP in an African country led to many discussions on what carbon finance meant to local people there. As the South African Minister for Science and Technology expressed at a side event[14], the carbon markets are full of acronyms and there is very rarely an appropriate translation in the vernacular, increasing the difficulty of explaining their purpose, let alone detailed methodologies, to newcomers. As well as the inexhaustible supply of acronyms, terms such as emission factors, fugitive emissions, leakage and credit fungibility were discussed at length in COP negotiations aimed at making carbon mechanisms more transparent and inclusive, yet very few people outside of the meetings would be able to explain the meaning of most of the terms or acronyms used. Those not conversant in the new language face a significant barrier to entering the carbon markets. At another side event a representative of the Ugandan Carbon Bureau described how difficult it

[14] COP 15 side event, 29th November 2011: 'Social sciences in a changing climate,' organised by the Human Sciences Research Council and International Social Science Council, with guest speaker Naledi Pandor, South African Minister for Science and Technology.

is to explain the concept of carbon finance locally in Uganda, where it ends up being known as 'smoke money' because of the association with the reduction of gases.

A Clean Development Mechanism (CDM) Methodology is a registered document that sets out the process that must be used in order to 'create' saleable certified emission reductions under the UNFCCC's CDM. CDM Methodology AMS-II.G (UNFCCC, 2012), for example, is used to estimate the volume of emission reductions from clean cookstove projects and sets out other requirements such as how the achievement of reductions over time should be monitored. Version 5 of AMS-II.G became valid on the 7th December 2012 after its approval at the 70th meeting of the CDM Executive Board, held during the 18th COP in Doha. The first version of the same methodology was adopted in February 2008 but only one project was registered under it. Based in Nigeria, it is likely that the German partners in that project (the carbon consultancy 'atmosfair' and the NGO 'LHL') were the prime developers of the original methodology since this is how they commonly arise. Subsequent revisions were then made following requests from various other project developers, looking to make the methodology more compatible and favourable for their own projects.

The key formula for estimating emission reductions using the AMS-II.G methodology is shown in Box 2 below. In summary, it states that the emission reductions generated in a year is equivalent to the volume of non-renewable biomass that each stove saves, multiplied by the emissions factor per unit of that biomass and the number of stoves in the project. In order to determine the savings of non-renewable biomass per stove, there is a choice of a further three different equations, each requiring some form of test procedure to be followed[15]. Even once the emission reductions have been estimated and the rest of the CDM project registration process completed, every two years similar tests must be carried out on a 'representative sample' of the stoves that have been sold to ensure that they are performing as expected, involving development of random sampling methodologies, identifying and visiting customers and further complex test procedures. Even the most basic monitoring plans require receipts with customer contact details to be able to identify a sample to survey in the first place, and more advanced projects now use GPS technology for marking the location of each stove sold. As described by one company: "The stove serial number is photographed and linked up with Google Earth via GPS, for easy identification at the monitoring stage."

[15] The choices include a Kitchen Performance Test (KPT), Water Boiling Test (WBT) or Controlled Cooking Test (CCT) and it is stated that relevant national standards or international guidelines (e.g. as developed by the Partnership for Clean Indoor Air www.pciaonline.org/testing) must be adhered to.

Box 2: Emission reductions calculation for a clean cookstoves project under CDM Methodology AMS-II.G (UNFCCC, 2012)

$$ER_y = B_{y,savings} \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossilfuel} \times N_{y,i}$$

ER_y = Emission reductions in year y (tCO_2e/yr)

$B_{y,savings}$ = Quantity of woody biomass that is saved in tonnes per device

$f_{NRB,y}$ = Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass using survey methods or government data or default country specific fraction of non-renewable woody biomass (fNRB) values available on the CDM website

$NCV_{biomass}$ = Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne, wet basis)

$EF_{projected\_fossilfuel}$ = Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 t CO_2/TJ

$N_{y,i}$ = Number of project devices of type i operating in year y, determined as per paragraph 22 [of methodology document]

Aggregation for access

In summary the scale, complexity and technical tools required to engage with carbon market devices make them inaccessible to most informal producers, resulting in further power asymmetries between different types of market actors. There have been some initiatives to try and address this balance. Impact Carbon is an NGO that originated from the Center for Entrepreneurship in International Health and Development, a research centre at the University of California, Berkeley. It has an office in Uganda which has set up and manages a Gold Standard carbon finance project on behalf of a local cookstove producer, Ugastove. Half of the income gained from credit sales is invested back in Ugastove, particularly to upgrade their manufacturing facilities. The remainder goes towards the NGO's administrative costs and to pay for external support from a for-profit carbon trading company. In this way the local manufacturers receive some of the credit value that they are unlikely to be able to access otherwise.

Another solution is the aggregation of projects under larger umbrella programmes, known as Programmes of Activities (PoAs). Uganda Carbon Bureau (UCB) has

taken this approach by using donor funding to establish an Improved Cook Stoves for East Africa PoA under which local cookstove manufacturers and projects can acquire carbon credits again without having to undertake the process themselves. As a member of their staff described: "Carbon finance can last for 21 years so it goes beyond donor money or government programmes. It used to be very difficult to keep a donor project going for more than 3 or 4 years. Carbon finance gives longevity." (UCB, Interview 15, 2012)

Valuation and ownership (property rights)

Although there appear to be various solutions to make carbon market devices more accessible to local producers, interviews showed that proponents of the different approaches were having some debate over the relative equity and feasibility of each. Representatives of UCB (Interview 15) asserted that Ugastove did not receive an appropriate share of the credit revenue from Impact Carbon and complained that stove users, who were in fact the legal credit owners, were excluded altogether. By contrast, UCB would only allow projects to join their PoA where the majority of revenue was being channelled back to both manufacturers and end-users, with suggestions of using mobile cash transfers or investment in community water projects to fulfil the latter requirement (although since the PoA was still being established there were not yet any examples of this). UCB also stated that each stove buyer under their PoA must have the concept of carbon credits clearly explained to them, despite the difficulties described earlier, prior to being asked to give informed consent for credits to be claimed on their behalf.

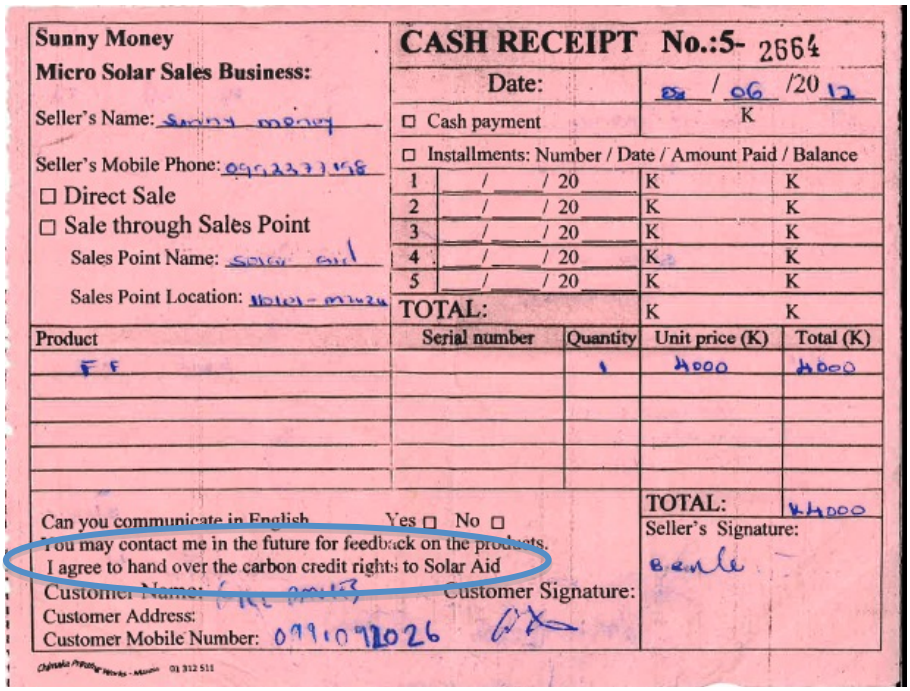
By contrast, representatives from Impact Carbon (Interview 13) felt that the 50% revenue-share passed to Ugastove was appropriate and the maximum possible, and did trickle down to consumers through reduced stove prices. Unlike UCB which used over US$250,000 in donor funding to set up their PoA and only required a small proportion of the credit revenue to pay for subsequent administration costs, Impact Carbon had taken a loan to establish the costly carbon finance project on behalf of Ugastove and was therefore needing to repay it, in addition to covering other ongoing costs. Managers from GVEP also agreed with this approach, one asserting that: "there is no way carbon finance can appeal to the private sector if it is not allowed to work in the way that Impact Carbon and Ugastove do it." Another carbon finance organisation working in Uganda (Interview 20, Carbon Africa, 2012) highlighted the complexity and risk inherent in promising to pay stove users over time, particularly given that carbon credits involve a huge amount of uncertainty in

how many will be obtained and when and are subject to variable market prices that at the time of research were particularly low.

Carbon credits add to the complexity of valuation by attaching another, often silent and invisible, benefit to low carbon products. It is only visible to those that have been taught to see and value it. In essence, during the act of consuming a product such as a solar lantern or cookstove, an end-user is producing a new commodity of which they are theoretically the legal 'owner' even if they generally do not realise it. Value can also be created beyond the greenhouse gas emission reductions. The Gold Standard, for example, requires higher levels of 'social benefits' to be delivered by its projects than other carbon finance mechanisms and thus Gold Standard credits are sold at higher 'premium' prices.

So how should it be explained to a local stove or lantern user that this additional value exists but that it has already been incorporated into the price of the products, and in return they must agree to give up legal ownership of the credit rights? And is this even really necessary for a market-based mechanism that is essentially a replacement for a more straightforward subsidy system? Within the carbon finance world it is seen as an important component of a project – demonstrating that the credit 'generators' have not covertly been stripped of their legal entitlement. Çalışkan and Callon (2010) note that even where property rights are relatively straightforward to ascertain, they require a suite of "specific technical, material, textual and legal devices" (p.7) for owners to be identified and to establish a process for change of ownership. Various methods have developed over time to transfer ownership of greenhouse gas emission reductions that themselves cannot be physically exchanged. The example of d.light's carbon credit statement on many of their lights has already been shown in Photo 27 above. As SolarAid initially intended to collect carbon credits, they have a 'rights waiver' printed on the receipts (Figure 38) that they previously issued in bulk to lantern sellers to give to customers. Above the customer name, a sentence states: "I agree to hand over the carbon credit rights to Solar Aid".

Figure 38: SunnyMoney cash receipt with carbon credit rights waiver encircled



Sunny Money
Micro Solar Sales Business:

Seller's Name: Sunny money

Seller's Mobile Phone: 0[illegible]

☐ Direct Sale
☐ Sale through Sales Point

Sales Point Name: Soroti

Sales Point Location: Mbale - Mwiri

CASH RECEIPT No.:5- 2664

Date: 28 / 06 /20 12

☐ Cash payment K

☐ Installments: Number / Date / Amount Paid / Balance

1	/ / 20	K	K
2	/ / 20	K	K
3	/ / 20	K	K
4	/ / 20	K	K
5	/ / 20	K	K
TOTAL:		K	K

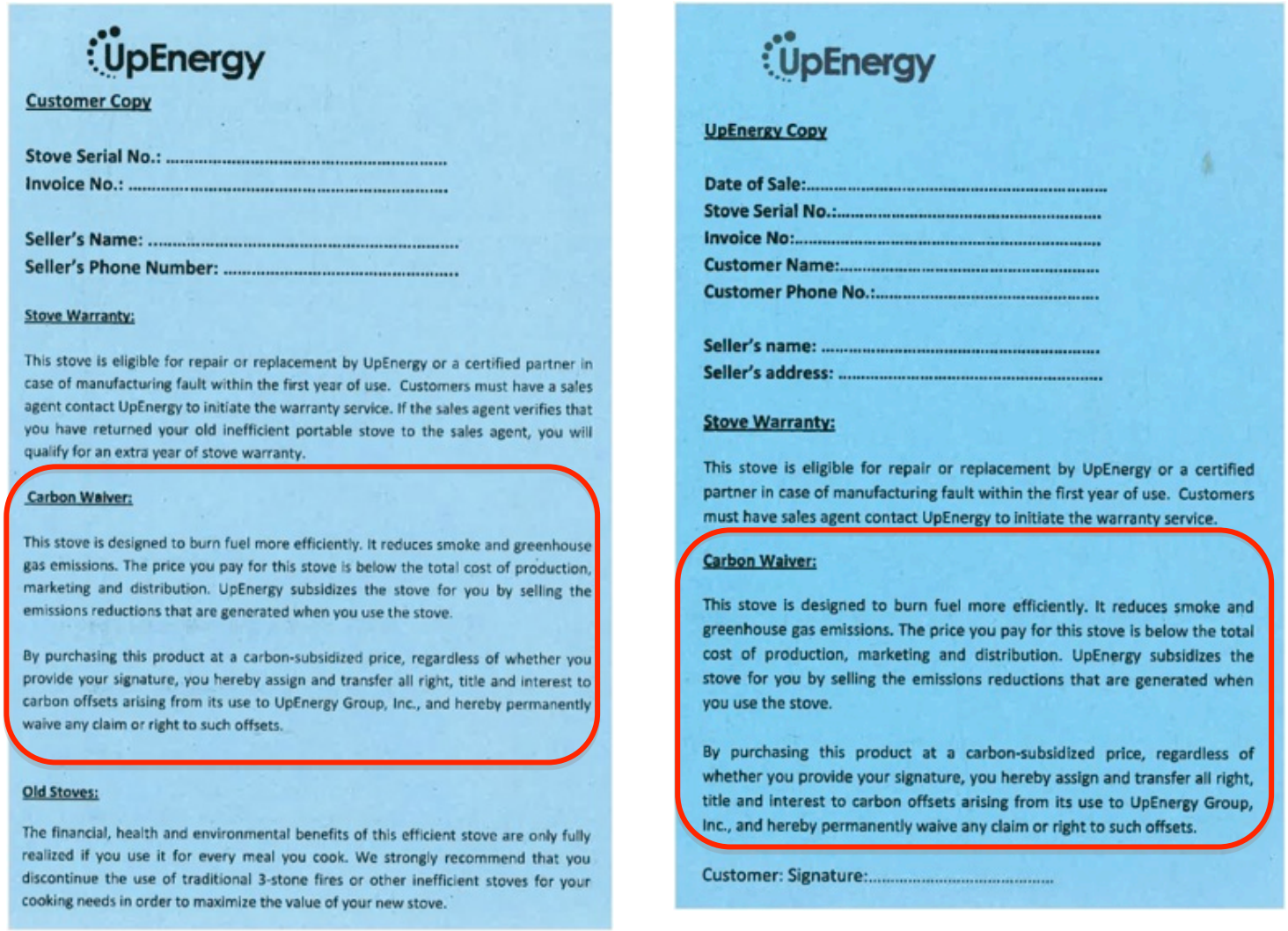
Product	Serial number	Quantity	Unit price (K)	Total (K)
F F		1	40000	40000
			TOTAL:	40000

Can you communicate in English Yes ☐ No ☐
You may contact me in the future for feedback on the products.
I agree to hand over the carbon credit rights to Solar Aid
Customer Name: [illegible] Customer Signature:
Customer Address:
Customer Mobile Number: 0791097026

Seller's Signature: Benle

Ugastove also put a carbon waiver on their combined receipt and warranty cards, as do Up Energy, another stove distributor in Uganda that Impact Carbon was in the process of registering a carbon finance project for at the time of this research. When a stove sale is made, if the new owner wants to be able to take advantage of a free one-year warranty then they must sign the documents shown in Figure 39 (Up Energy) and Figure 40 (Ugastove), and thus the carbon waiver. Ugastove provide a Lugandan translation on the same warranty card; Up Energy did originally make some cards in Luganda, but since it is not spoken in all regions it was decided to keep them in the official language of English. Copies of these warranty cards are also very important for the sales companies as they provide user contact details which are needed for carrying out the monitoring requirements of the carbon finance projects. This also is part of the reason for the statement made in bold beneath the Ugastove carbon waiver (Figure 40), highlighting that the environmental benefits only come from regular use and displacement of the previous less efficient cooking method. The monitoring visits will partly be to assess that this is happening; if it is not, the number of carbon credits claimed have to be reduced accordingly.

Figure 39: UpEnergy warranty card with carbon credit rights waiver encircled (customer copy left, company copy right)



UpEnergy

Customer Copy

Stove Serial No.: .....
Invoice No.: .....

Seller's Name: .....
Seller's Phone Number: .....

Stove Warranty:

This stove is eligible for repair or replacement by UpEnergy or a certified partner in case of manufacturing fault within the first year of use. Customers must have a sales agent contact UpEnergy to initiate the warranty service. If the sales agent verifies that you have returned your old inefficient portable stove to the sales agent, you will qualify for an extra year of stove warranty.

Carbon Waiver:

This stove is designed to burn fuel more efficiently. It reduces smoke and greenhouse gas emissions. The price you pay for this stove is below the total cost of production, marketing and distribution. UpEnergy subsidizes the stove for you by selling the emissions reductions that are generated when you use the stove.

By purchasing this product at a carbon-subsidized price, regardless of whether you provide your signature, you hereby assign and transfer all right, title and interest to carbon offsets arising from its use to UpEnergy Group, Inc., and hereby permanently waive any claim or right to such offsets.

Old Stoves:

The financial, health and environmental benefits of this efficient stove are only fully realized if you use it for every meal you cook. We strongly recommend that you discontinue the use of traditional 3-stone fires or other inefficient stoves for your cooking needs in order to maximize the value of your new stove.

UpEnergy

UpEnergy Copy

Date of Sale:.....
Stove Serial No.:.....
Invoice No:.....
Customer Name:.....
Customer Phone No.:.....

Seller's name: .....
Seller's address: .....

Stove Warranty:

This stove is eligible for repair or replacement by UpEnergy or a certified partner in case of manufacturing fault within the first year of use. Customers must have sales agent contact UpEnergy to initiate the warranty service.

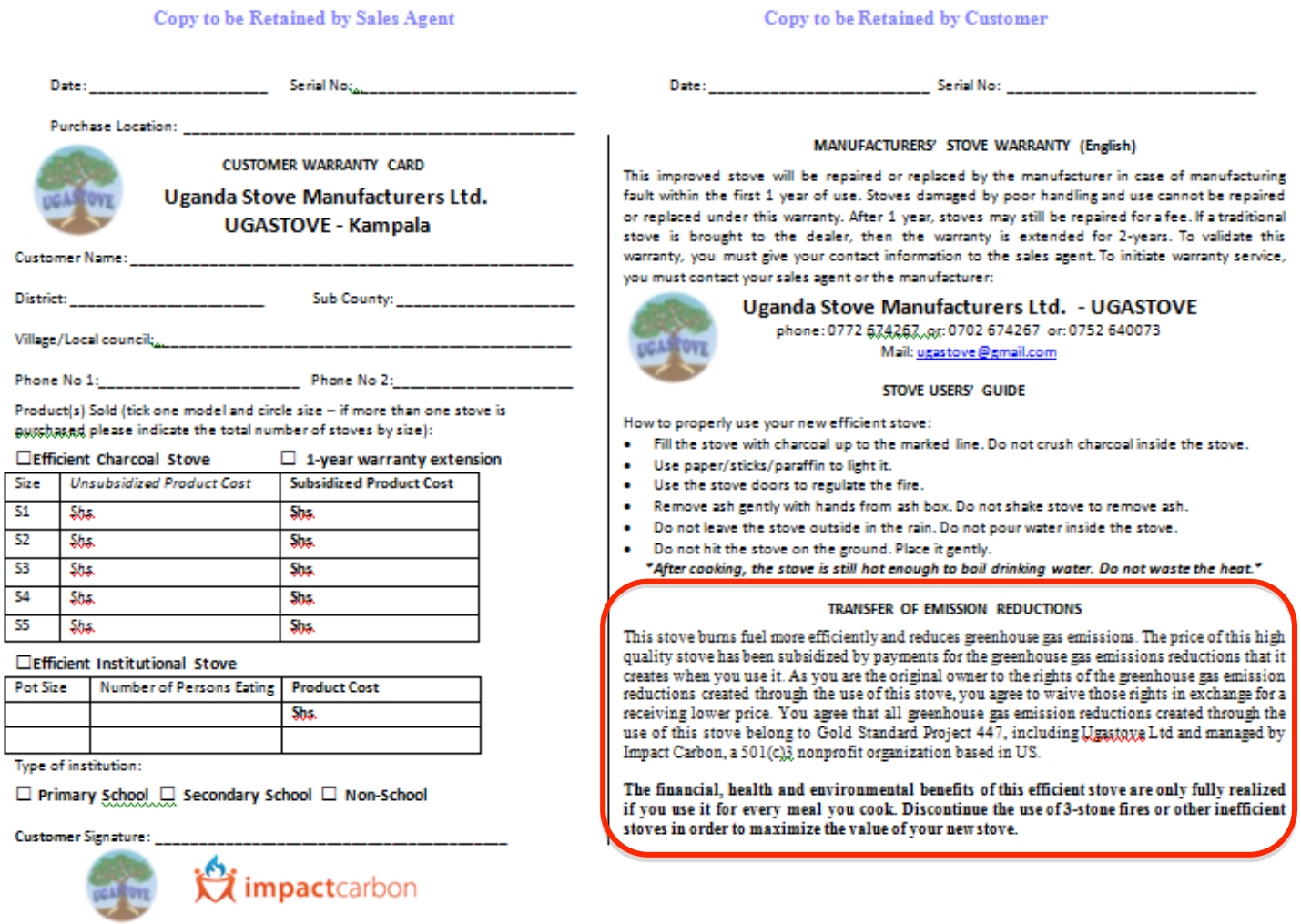
Carbon Waiver:

This stove is designed to burn fuel more efficiently. It reduces smoke and greenhouse gas emissions. The price you pay for this stove is below the total cost of production, marketing and distribution. UpEnergy subsidizes the stove for you by selling the emissions reductions that are generated when you use the stove.

By purchasing this product at a carbon-subsidized price, regardless of whether you provide your signature, you hereby assign and transfer all right, title and interest to carbon offsets arising from its use to UpEnergy Group, Inc., and hereby permanently waive any claim or right to such offsets.

Customer: Signature:.....

Figure 40: Ugastove warranty card with carbon credit rights waiver encircled in red (company copy on left, customer copy on right)



Copy to be Retained by Sales Agent

Date: _____ Serial No: _____

Purchase Location: _____

CUSTOMER WARRANTY CARD

Uganda Stove Manufacturers Ltd.
UGASTOVE - Kampala

Customer Name: _____

District: _____ Sub County: _____

Village/Local council: _____

Phone No 1: _____ Phone No 2: _____

Product(s) Sold (tick one model and circle size – if more than one stove is purchased please indicate the total number of stoves by size):

☐ Efficient Charcoal Stove ☐ 1-year warranty extension

Size	*Unsubsidized Product Cost*	Subsidized Product Cost
S1	Shs.	Shs.
S2	Shs.	Shs.
S3	Shs.	Shs.
S4	Shs.	Shs.
S5	Shs.	Shs.

☐ Efficient Institutional Stove

Pot Size	Number of Persons Eating	Product Cost
		Shs.

Type of institution:

☐ Primary School ☐ Secondary School ☐ Non-School

Customer Signature: _____

impactcarbon

Copy to be Retained by Customer

Date: _____ Serial No: _____

MANUFACTURERS' STOVE WARRANTY (English)

This improved stove will be repaired or replaced by the manufacturer in case of manufacturing fault within the first 1 year of use. Stoves damaged by poor handling and use cannot be repaired or replaced under this warranty. After 1 year, stoves may still be repaired for a fee. If a traditional stove is brought to the dealer, then the warranty is extended for 2-years. To validate this warranty, you must give your contact information to the sales agent. To initiate warranty service, you must contact your sales agent or the manufacturer:

Uganda Stove Manufacturers Ltd. - UGASTOVE
phone: 0772 674267 or: 0702 674267 or: 0752 640073
Mail: ugastove@gmail.com

STOVE USERS' GUIDE

How to properly use your new efficient stove:

- Fill the stove with charcoal up to the marked line. Do not crush charcoal inside the stove.
- Use paper/sticks/paraffin to light it.
- Use the stove doors to regulate the fire.
- Remove ash gently with hands from ash box. Do not shake stove to remove ash.
- Do not leave the stove outside in the rain. Do not pour water inside the stove.
- Do not hit the stove on the ground. Place it gently.

After cooking, the stove is still hot enough to boil drinking water. Do not waste the heat.

TRANSFER OF EMISSION REDUCTIONS

This stove burns fuel more efficiently and reduces greenhouse gas emissions. The price of this high quality stove has been subsidized by payments for the greenhouse gas emissions reductions that it creates when you use it. As you are the original owner to the rights of the greenhouse gas emission reductions created through the use of this stove, you agree to waive those rights in exchange for a receiving lower price. You agree that all greenhouse gas emission reductions created through the use of this stove belong to Gold Standard Project 447, including Ugastove Ltd and managed by Impact Carbon, a 501(c)3 nonprofit organization based in US.

The financial, health and environmental benefits of this efficient stove are only fully realized if you use it for every meal you cook. Discontinue the use of 3-stone fires or other inefficient stoves in order to maximize the value of your new stove.

This method of waiving carbon credit rights was another point of dispute with staff at Uganda Carbon Bureau (Interview 15, 2012), who felt that "some people are getting ripped off, the women who produce the emission reductions from cookstoves have to sign their rights to carbon credits away on the warranty without realising it." They also said that they had written to the Gold Standard to highlight the inadequacy of this method, using the metaphor of selling agricultural equipment: "you don't sell a plough then say you own the coffee produced in the field that it ploughed." When I asked them about this in a follow-up interview, Up Energy managers responded that they had already heard these complaints and had therefore tried to meet with UCB at various times to ask for their ideas for an improved method, yet none was ever provided: "it's not constructive criticism, they don't follow it up with suggestions of how to do it differently" (Interview 12, follow-up, 2012). Up Energy managers also stated that they gave thorough training to their sellers on communicating the carbon credits waiver, but in reality spending enough time with each buyer to explain this complex financial mechanism would jeopardise their ability to make sales and thus lose any direct benefits that the stoves were there to provide in the first place.

Relevance of carbon

From talking with various stakeholders in carbon finance projects in Kenya, Uganda and Malawi, it seemed that these market devices may have had limited impact on the emergence of the solar lantern market, mainly because the number of carbon credits it was possible to obtain per lantern sold was not enough to provide a significant revenue stream, once transaction costs of activating the market device were taken into account. Nevertheless, many solar lantern manufacturers have established projects, or were in the process of doing so. ToughStuff was undertaking a stakeholder consultation in Kampala for their regional CDM PoA at the time of research. They were particularly keen to obtain the carbon credits in order to subsidise their lanterns for entering new markets such as Ethiopia with competitive and locally affordable prices. For clean cookstoves, it was commonly felt that carbon credits had been a significant driver of the resurgence of interest. After a first wave of donor-funded projects in the 1970s and 1980s, donor interest had waned due to the apparent lack of overall market growth (Crewe and Harrison, 1998). More recently there had been a huge increase in the number of related projects and, as one carbon project developer asserted: "cookstoves wouldn't have taken off without carbon finance."

This market growth impact has been reliant on market actors that have the necessary financial, cognitive and technical tools to bring carbon finance devices to life. The issues discussed earlier in this chapter, however, also demonstrate how unequal access to these market devices leaves local manufacturers reliant on carbon 'brokers' that employ varying approaches. It also possibly makes them, including those that have had ongoing support from donors over numerous years, vulnerable to market actors that are empowered by their ability to harness these market devices for their own activities, for example importing heavily subsidised stoves and steam-rolling local market activity. This point is taken up further in Chapter 0.

The significance of carbon finance devices also ultimately depends on the price that carbon credits obtain in the global carbon markets: a process that just like the valuing and pricing of energy products involves a plethora of associated actors, activities, discourses and devices. Without exploring these further here, in summary the price of carbon credits was falling throughout the research period and subsequently, particularly for credits in the 'compliance' market driven predominantly by international agreements to reduce greenhouse gases under the Kyoto Protocol. The key reason for falling prices was the lack of progress made in agreeing a successor to this framework that ended in December 2012. In November 2012, a CDM newsletter produced by the climate programme of the German development agency GIZ stated that: "in October, for the first time ever, CER prices have fallen below 1 Euro. This means prices are currently able to roughly cover transaction costs for project registration and issuance. This decline undermines trust in carbon markets and will surely not mobilize new additional CDM projects that really depend on CER revenues." (Sehlleier and Michaelowa, 2012) By March 2013, the price had dropped further: "the market is essentially deadlocked, with prices persisting at a level of around 0.3 €/CER and project inflow for validation having fallen back to a level last seen in 2004. This situation is unlikely to change anytime soon." (Blank and Michaelowa, 2013)

As highlighted by many countries at COP17 in Durban, discussions of the technicalities of the CDM are irrelevant without demand for the carbon credits they produce. There are similar mechanisms that have a more promising outlook, however, such as those that provide credits for the voluntary market that is not dependent on an international climate agreement; one carbon finance company said they were focusing on these because voluntary credit prices were currently three times the price of 'compliance' credits. There is also potential for other similar

mechanisms in the future[16], for which some of the arguments made here about their costs and complexity and thus unequal access and power asymmetries for different market actors are also likely to be relevant.

6.5 Summary of findings

This chapter has placed the energy products themselves at the centre of the discussion in order to address the research question:

> How are the clean energy products stabilised, qualified, valued and priced for exchange as market goods?

The findings are summarised below, divided into key themes.

Emergence of products with meaning and value

The interest of development intermediaries in energy products is driven by their conceptualisation as humanitarian goods. This in turn is derived from their 'problematisation,' whereby the ability of a product to solve a specific development-relevant problem establishes the case for investment of time and money into its design, production and distribution to those that 'need' it. The discussion here has shown that problematisation is multi-dimensional and depends on the targeted investors, proposed approach and intended 'beneficiaries'. For example, kerosene, a common but hazardous lighting fuel, is now key to engaging development stakeholders in solar lantern projects, but as discussed here this has not always been the case. SolarAid also previously concentrated on the need for local employment that could be provided through their locally assembled solar kits. This later dropped in priority as they moved to imported lanterns and then even away from solar 'entrepreneurs' to already established 'dealers' in order to increase the efficiency of sales. The problem of kerosene had become the bigger issue, needing to be tackled at all costs. More recently, needing good quality lighting for education purposes has also become central to SolarAid's framing of their work.

Literature promoting market-based approaches to development (e.g. Prahalad, 2010) promotes moving the conceptualisation of the poor away from charity to potential consumers. However, analysis here finds that the continued focus on appealing to 'development' stakeholders stops the targeted end-users of solar lanterns moving entirely away from been seen as charity beneficiaries. They have not yet fully

[16] Delving into the language and acronyms of international climate negotiations, these future devices may include a 'New Market-Based Mechanism' (NMM), a 'Framework for Various Approaches' (FVA) or credited 'Nationally Appropriate Mitigation Actions' (NAMAs) (Blank and Michaelowa, 2013).

achieved the status of modern consumers that market-based approaches apparently aim to serve. Since development funds are clearly still needed, this conceptualisation is not necessarily problematic, but it does provide a restrictive lens for viewing the applications of these products and places limits on which technologies can be suitably 'problematised'. Can solar-powered televisions, for example, be framed as humanitarian goods? At the same time, other technologies are displaced with knock-on impacts on local market actors working in those supply chains. This is something rarely acknowledged or addressed by 'development' programmes as they are left outside of the programmes' boundaries.

An object can only become an exchanged 'economic good' when it is positively valued by both buyer and seller. This means that energy product designers and distributors must still put considerable emphasis on creating value for end-users, regardless of how they conceptualise those end-users. It is a clear benefit of the move away from 'free hand-out' models towards market-based approaches. Valuation is unique for every actor and product they engage with and goes much further than simple 'economic' value. For example, in the countries focused on for this research, connotations of modernity were seen to be important.

Two-way communication channels

Marketing material provides a communication channel from manufacturer to prospective end-user that draws on their aspirations, by visually and descriptively illustrating contented customers using a product to fulfil their lifestyle desires. In the material observed this has been done to mixed extents, perhaps indicating the fairly recent engagement of traditional development intermediaries with core 'business' skills such as marketing techniques. The marketing examples observed here also show that development-stakeholders perceive different reasons for potential end-users to value clean energy products, but further research might explore the accuracy of some of these perceptions; environmental benefits may be more valued by consumers than assumed, for example.

After its exchange, a product can only solve its designated 'problem' if the buyer knows how to use it in they way intended by the designer. Again communication channels from the manufacturer to the end-user must therefore exist, this time in parallel to the product exchange. Local sellers can act as human communication channels, but material artefacts such as instruction sheets can also provide the same facility. For the imported energy products observed during this research, the lack of translation of instructions into local languages was therefore surprising, although

more widely accessible pictorial instructions were more common. Product quality can also be communicated to users through standards certifications, often stamped onto goods or their packaging. The significance of adherence to quality standards for individual buyers in these markets is unclear, however, and again merits further research.

Given the need for products to have meaning and value for end-users in market-based approaches, communication channels in the other direction are also essential: the ability to successfully gather and incorporate end-user feedback into design processes appears to be marking out the competitive edge of manufacturers. Where manufacturers have no presence in a country, such as no solar lantern manufacturers having their own distribution chains in Malawi, the feedback channels are inevitably more limited. If imported products are the only option available, this unfortunately restricts the emergence of designs that are specifically tailored to local contexts.

By comparison, locally made products offer the advantage of direct communication channels between makers and users; the makers are often even end-users themselves. As has been shown in the examples of local cookstove and briquette innovations in Kenya and Uganda, this leads to a much larger range of local adaptations that can better suit local use patterns and resource availability, all without any complex field trials or laboratory tests.

Market devices for standardisation, quality assurance and consumer protection

Another determining influence of which energy product designs have become dominant over time is the evolution of standardisation tools. For example, a standard size system and metal liner moulds were instrumental in the emergence of disaggregated manufacturing of KCJ cookstoves, which in turn contributed to the design's dominance in Kenya. Standardisation tools are also a fundamental element of creating consistent product quality, but material tools are needed for this. Local briquette manufacturers in Kenya and Uganda do not always have access to weighing scales, for example, leading to alternative systems such as selling briquettes 'by the bucket'.

This inaccessibility of a relatively simple market device may not be an issue for briquette makers who are not trying to compete with imported goods. However, high technology products such as solar lanterns result from engagement with a much greater array of more complex market devices. These ensure that lanterns are

of high and consistent quality and enable them to come with detailed evaluative information such as 'brightness in lumens.' Market devices cannot function if part of the necessary assemblage is incomplete, however, showing why African-made products can struggle to compete when significant components of these market devices, such as luminosity test facilities, are unavailable locally.

Due to the increasingly complex and extensive socio-technical components of quality assurance schemes, these also represent another market device that local artisan manufacturers can struggle to access. Successful engagement with a quality device may only manifest itself as a simple but important-sounding statement on marketing and packaging materials, but they in fact require access to complex systems of testing equipment, standards specifications, certification bodies and more. If a quality mark does have limited meaning for a local buyer, as suggested above, then artisan manufacturers are not necessarily disadvantaged by a lack of access, but when larger formal buyers such as supermarkets will only buy quality-assured products then there is a clear narrowing of opportunities for local entrepreneurs.

Patenting frameworks are another example of a frequently inaccessible market device, although the 'informal economy' does offer opportunities for usurping the power of those actors that are able to engage with such devices. Similarly, the utility of quality standards can also be diminished by the evident ways in which quality-checking of imported products can be by-passed in countries such as Kenya, Uganda and Malawi. This continues to be a problem for solar equipment and means that in fact even those actors than can and do engage with quality devices may end up being disadvantaged by their adherence to these systems. A resultant lack of trust from consumers in both the product type and quality standards is also perhaps unsurprising. This continued issue highlights the need for enforceable and continually updated legal frameworks to maintain integrity of such market systems; unfortunately this is something that continues to be problematic in many African countries. While Lighting Africa has established a state-independent quality assurance system that other development-related organisations have engaged with, as a voluntary scheme its impact is inevitably constrained.

Warranty systems are again also inaccessible to many, particularly to SunnyMoney customers in Malawi where manufacturers have no in-country presence and do not help SunnyMoney to fulfil warranty obligations. Furthermore many of the socio-technical components needed to complete the warranty device can be missing: a receipt to demonstrate purchase date, a common understanding of the warranty

concept, the physical means to easily pass faulty products back along a geographically extensive supply chains. Overall, it is clear that more locally appropriate solutions are required.

Price-setting tools and market distortions

Qualification and valuation processes ultimately lead to seller and buyer price-setting activities that only finally converge at the moment of exchange. Calculative tools known as 'valorimeters' can range from simple 'costs plus profit' models to 'cost-benefit analysis' and 'willingness to pay' studies. During this research, the more complex of these were perhaps unsurprisingly observed being utilised by larger organisations rather than individual buyers or sellers, suggesting limited extents to which the latter have been rendered 'economic' actors. Practical considerations such as lack of access to capital suggest that complex economic tools could be a luxury for those with greater financial power, however, rather than a cognitive inability. When market 'macro-actors' are able to deviate significantly from pricing models directly related to the production of goods, for example through access to subsidies and grants, they gain the power to restrict other marketisation processes by dominating the market with high value but distortedly low-priced products.

This last point is particularly illustrated by a focus on carbon finance mechanisms that have 'black-boxed' processes of calculating and 'monetising' reduced greenhouse gas emissions as carbon credits. They have created a resurgence in interest in cookstoves amongst donors and development intermediaries through offering a significant potential income stream to marketisation projects, but unfortunately the material, financial and cognitive complexity of these market devices make them once again inaccessible to many local artisans, and thus again empowering of larger actors that do have the agency to engage with them. There are some solutions where small projects can be aggregated and development intermediaries act as carbon finance 'brokers'. The local actors are dependent on this opportunity being available and have to accept the specific set-up employed, but it has helped some gain access.

The requirements of carbon finance mechanisms also add a complex scenario of nominally transferring 'property rights' for carbon credits using various convoluted means that appear more confusing than transparent, and far removed in significance from the daily priorities of cookstove end-users. The relevance of 'regulatory' mechanisms such as the Clean Development Mechanism is reducing

due to lack of a replacement or extended international climate change agreement beyond Kyoto, but there remains potential from voluntary markets. Like the other market devices described in this chapter, modification work is necessary to allow greater equity in access and reduce the power asymmetries that continue to strengthen 'macro-actors'.

7 The entrepreneurs: their conversion into 'economic' actors

> Subjectification implies that, if some modes of valuation are seen as economic and if they are related to behaviours also considered as economic, it is because agents have been configured and formatted as subjects who are technically and mentally equipped to enact these valuations. Instead of being driven by forces which are above or beyond them, subjectified agents are actively engaged with the very cognitive and material devices that enable them to participate as economic subjects. (Çalışkan and Callon (2009) p.389)

While the previous chapter focused on the creation of 'products' and their valuation, this chapter examines in further detail some of the people who are integral to this production, valuation and exchange process. Although the focus is on people, it is not to say that their agency is created only through their human characteristic. As the above quotation highlights, economic actors are actively engaged through forming and applying cognitive and material devices that shape their activities as market actors. Yearley (2005), for example, also reminds us that the technologies and scientific (in this case economic/business) concepts, techniques and tools that bind society together cannot be ignored. These non-human components of society, or 'dark matter' (Latour, 1992), should not be separated from a social analysis. As MacKenzie (2009b) describes, a human with a calculator may undertake very different actions to someone without one.

The markets in these case studies are not tangible entities in themselves: if people stopped performing their roles 'the market' would no longer exist. Instead they are systematic ways in which everyone learns to interact with each other, with products and money being circulated, using tools and devices to support their flow and following certain 'rules' and types of 'economic behaviour'. In essence, collective performance of everyone fulfilling a particular economic role is what creates the market. This chapter examines some of the processes of 'economization', or more specifically 'marketisation', whereby the case study development intermediaries (marketisation actors) intentionally select, train and support local people to 'perform' a role in the supply chain of clean energy products. It addresses the third research question:

> What processes render local people into 'entrepreneurs' and thus economic actors?

It is argued that 'conversion' into the specific type of economic actors that the intermediaries require starts with the application and absorption of the 'entrepreneurship' discursive device. The one-to-one relationships at the intermediary-entrepreneur interface are found to be key in facilitating and building on this. However, these are not passive actors to be newly economised; their existing skills, networks, ideas, tools and facilities, sometimes already 'economic' and sometimes not, can be drawn on at will to make each market performance unique. It also means that there is no foolproof method for determining which individuals will best 'perform' a market role in the specific way envisaged by the development intermediaries. This means that increasingly those already with more market agency are being selected, perhaps representing a shift away from true 'BOP' entrepreneurs.

The main components of an entrepreneur's agency are discussed here in turn: their knowledge and application of 'economic' tools; their technical capacity and the physical tools and facilities required, and; their agency as created by the networks they are part of. Where entrepreneurs already have relevant skills, tools and networks, the development intermediaries encourage their incorporation into economic activities and promote moving from informal to formal practices. Where they are lacking, support is provided to develop or acquire them.

This 'economisation' of entrepreneurs can be problematic, however, such as entrepreneurs becoming reliant on formal indebtedness without exploration of alternative options, and putting strain on their existing trust-based relationships. However, it is argued that development intermediaries acting as 'brokers' can also benefit the entrepreneurs. Helping them to form new relationships, for instance, can enhance entrepreneurs' agency, not just in economic terms. Ultimately, the entrepreneurs become marketisation actors themselves through their performance, for example using marketing techniques to persuade consumers to 'buy in' to the framing of products as outlined in the previous chapter.

7.1 Entrepreneur recruitment

With an initial target of recruiting and supporting 1800 micro and small enterprises (MSEs), the lynch pin of GVEP's Developing Energy Enterprises Project (DEEP) is the 'entrepreneurs' who run these businesses and receive support under DEEP, primarily in the form of business and technical training and mentoring. By December 2011, there were 772 individuals or groups being supported by the

programme, attributed to selling over 616,00 clean energy products in total in the preceding three month period (GVEP International, 2012b).

From the outset the strategy for recruiting entrepreneurs had a strong focus on existing connections, with the project plan outlining that: "all partners will participate by reaching out to their contacts and networks within East Africa" (GVEP International, 2006). From talking with those involved in the start-up phase of DEEP, the recruitment had indeed been highly dependent on the networks of the partner organisations involved. Some of the staff at those organisations already knew of people or groups who would be suitable, having made contact with them as part of previous development initiatives. Existing or specifically made connections with local government structures were also utilised. In Kenya, for example, the Ministry of Agriculture's Home Economics department was able to provide the Aga Khan Foundation and Practical Action (DEEP mobilisation partners) with lists of known groups in each area who had done pottery training under a Ministry scheme previously, so were known to them and had an existing skill that could be adapted to making liners for efficient cookstoves.

Individuals and groups that had business permits for energy-related businesses were found via the relevant local authorities. Connections were also made through the local Energy Centres ("Mtwapa") established by the Ministry of Energy. These knew of further energy-related businesses or interested people, since their role was to promote awareness of locally viable energy solutions. All of these initial connections then led to a snowball effect: once a few groups and individuals were known to DEEP recruiters, they were able to suggest others who might be interested in taking part. On top of this there were also some unrelated 'chance' encounters, such as when GVEP staff saw a briquette-making machine in a restaurant one lunchtime and found that the restaurant owner produced, used and sold biomass briquettes to other restaurants. He was soon recruited into DEEP.

People interested in setting up energy businesses that had not yet done so were also sought so that DEEP could add to the total number of energy enterprises as well as support those already existing. DEEP recruiters explained how they went to marketplaces to see if anyone there had already set up some form of energy business or would be interested to do so. A detailed example of this is given in Box 3 below. They also undertook some door-to-door mobilisation and advertising via poster and local radio (Photo 30).

Box 3: GVEP solar phone charging entrepreneur recruitment around Mombasa, Kenya

During the fieldwork, additional entrepreneur recruitment was being undertaken to bring the total numbers closer to the target level. I joined a recruitment day for new DEEP solar phone charging entrepreneurs in the coastal region of Kenya. Our team consisted of a GVEP business development officer, the GVEP business mentor for the region, and a representative from Sollatek – a recently made associate partner organisation of GVEP. Sollatek import solar panels into Mombasa and had agreed to provide a discount for the new DEEP solar entrepreneurs.

The first point of contact was John, a solar salesperson and technician working in Taru, a small village about half an hour's drive west of Mombasa. He took us round Taru introducing us to his customers who already had solar panels for their kiosks. The idea was to bring these people under DEEP in order to further their market understanding and thus help them expand their business. We then proceeded to a village further afield, Kinango. Being well off the main Mombasa-Nairobi highway, it involved about an hour's drive down a long dirt track in the pick-up. The GVEP staff explained that the village already had some DEEP cookstove entrepreneurs there but no one doing solar charging. The cookstove sellers had been recruited during a marketplace seminar by one of the DEEP implementation partner organisations back in 2008.

A large sound-system had been rented and put in the back of a second pick-up that followed us down the dirt track. Once at the village, the GVEP business development officer was driven round in it while he introduced DEEP over the PA system and told people to gather in the village centre if they wanted to hear more about it. Their announcements were interspersed with very loud Nigerian pop songs that seemed to help catch people's attention and resulted in several groups of children dancing enthusiastically.

Photo 28: Sound-system used to introduce DEEP and announce the recruitment event

At the allocated location and time, the music went quiet and the DEEP staff made their presentation about the virtues of solar systems, the viability of using it to charge phones as a

business, and asking for anyone interested to step forward. The requirement was that they had the capital to buy a solar system at the special discount rate being offered by Sollatek and some sort of kiosk or other business to put it on and operate from. In return for joining DEEP they would receive business and solar technical training, as well as regular visits from the business mentor. Around 14 application forms ended up being filled in and the applicants were given the mobile phone number of the solar sales rep. However, as it was up to these prospective entrepreneurs to subsequently arrange a solar purchase, the GVEP staff would only find out the actual number of new DEEP entrepreneurs at their next visit to the village and/or by making follow-up phone calls to the applicants over the next few weeks.

Photo 29: DEEP business development officer describing DEEP to assembled listeners (left); interested participants perusing information sheets (right)

Photo 30: Poster for DEEP recruitment, pinned to the kiosk of a DEEP solar lantern seller in Mombasa, Kenya

The geographical selection of marketplaces and radio stations was always dependent on the partner organisations' locations, as were the recruitment activities for existing businesses. This led to distinct pools of entrepreneurs in specific clusters across each region (Table 5). Once one individual or business heard about the scheme they would often tell friends and neighbours about it, adding to the clustering effect. Equally, the regions covered by DEEP in Kenya and Uganda were very specifically linked to the geographical locations of the partner organisations during the start-up phase. There was by no means even coverage across the countries and at first glance the location of DEEP entrepreneurs on a map looks randomly clustered; at closer inspection, it illustrates how the recruitment phase evolved and which organisations were involved.

Table 5: Geographical distribution of DEEP entrepreneurs in Kenya and Uganda, December 2011 (GVEP International, 2012b)

Country	Region/Cluster	Areas served	Number of entrepreneurs
Kenya	Cluster 1 - Coast	Taita, Mariakani, Mombasa, & South Coast	47
	Cluster 2 - Central	Central Kenya and Nairobi	58
	Cluster 3 - Kisii	Kisii, South Nyanza, Nakuru & Naivasha	31
	Cluster 4 - Kisumu	Kisumu, Siaya, Webuye, Busia, Kericho	58
Uganda	Cluster 1 - Wakiso	Nangabo, Nsangi, Katabi/Sissa, Luwero, Katikamu, Busoke,Latisi	121
	Cluster 2 - South Buganda	Kalungu, Kifuuta, Kyotera and Njale	51
	Cluster 3 - Eastern Uganda	Mbale & Lira	41
	Cluster 4 - Kampala	Kampala, Mukono, Katoosi, Kasubi, Namanve, Kyewatule and Mbeya	98

SolarAid's entrepreneur recruitment could also be linked to encounters through existing networks, often with no obvious relevance to 'economic' activities. The first entrepreneurs were recruited when the Irish founder of the Malawi office made contact with a community group in Mzuzu called 'Ungwera' through connections his uncle had made as a visiting Catholic priest. This group became the first to be trained in assembling pico-solar products and some of them became involved in selling them. One was a woman called Mrs Msewa, whose husband Kingsley then also started selling the lights. He subsequently rented a kiosk in Mzuzu marketplace and over time, as his relationship with SolarAid strengthened, became the primary SunnyMoney salesman and technician in Mzuzu.

Around the same time a similar shop was established about a 40-minute drive east from Mzuzu, at the lakeshore town of Nkhata Bay. One of the other Ungwera members, Brave, came from Nkhata Bay and had started selling the solar lights in his home region. He made contact with a woman there who was well known for making and selling fruit juices from her kiosk, initially to sell her a light for her business at night but she then also started to help him sell them by displaying them at her shop. On seeing the lights, one of her customers asked her if Brave could come to his village to demonstrate them to his church group and tell them how they too could make a business out of making and selling them. Brave obliged and the church group also became trained as solar 'entrepreneurs'. One of those in the

group was JB Nwende, formerly a dairy farmer, who turned out to be particularly good at sales. He was subsequently introduced to the core SolarAid staff and when they wanted to set up a shop in Nkhata Bay, they helped him move 30 kilometres from his home village to the town to set up the shop there. Three years later, during my fieldwork period, he was still there running the shop. Again, these distinct events led to an unplanned clustering effect of SunnyMoney entrepreneurs.

Local individuals have clearly not become involved in the marketisation activities of these development intermediaries through a cold, systematic process. Their awareness of the case study initiatives was through a web of relationships or networks, often entirely separate to economic activities, and the chance of an encounter at the relevant time. There are undoubtedly numerous people who might have excelled under DEEP or SunnyMoney but for whom no encounter ever took place. Equally the agency of the development intermediaries, GVEP and SolarAid, as marketisation actors, able to find people willing and appropriate to be part of their new market visions, has been seen to rely heavily on their own networks with other organisations, government bodies and so on. Even staff from GVEP coincidently eating in a restaurant that turned out to be owned by a briquette-maker led to the owner being recruited as a DEEP entrepreneur. This very 'weak' connection, to use Granovetter's (1982) term[17], added to the agency of both GVEP and the restaurateur as market actors.

7.2 Entrepreneur selection

After becoming aware of and interested in the initiatives, in order to be absorbed into the full process of 'marketisation' local actors were nominally subjected to a screening procedure to check if they would fulfil the required 'entrepreneur' roles. For SolarAid, it seems that this selection was fairly limited and informal: willing groups of prospective entrepreneurs were automatically trained in assembly and sales of pico-solar products. Following the phase-out of the assembly side there was then a significant element of self-selection through previous good performance, since those that had shown themselves to be willing and adept at selling the products (such as Kingsley and his wife and JB Nwende) continued to be engaged with as sales entrepreneurs.

SolarAid's limited more recent recruitment of solar 'entrepreneurs' has used more formal entrepreneur screening methods. A partnership with the MicroLoan

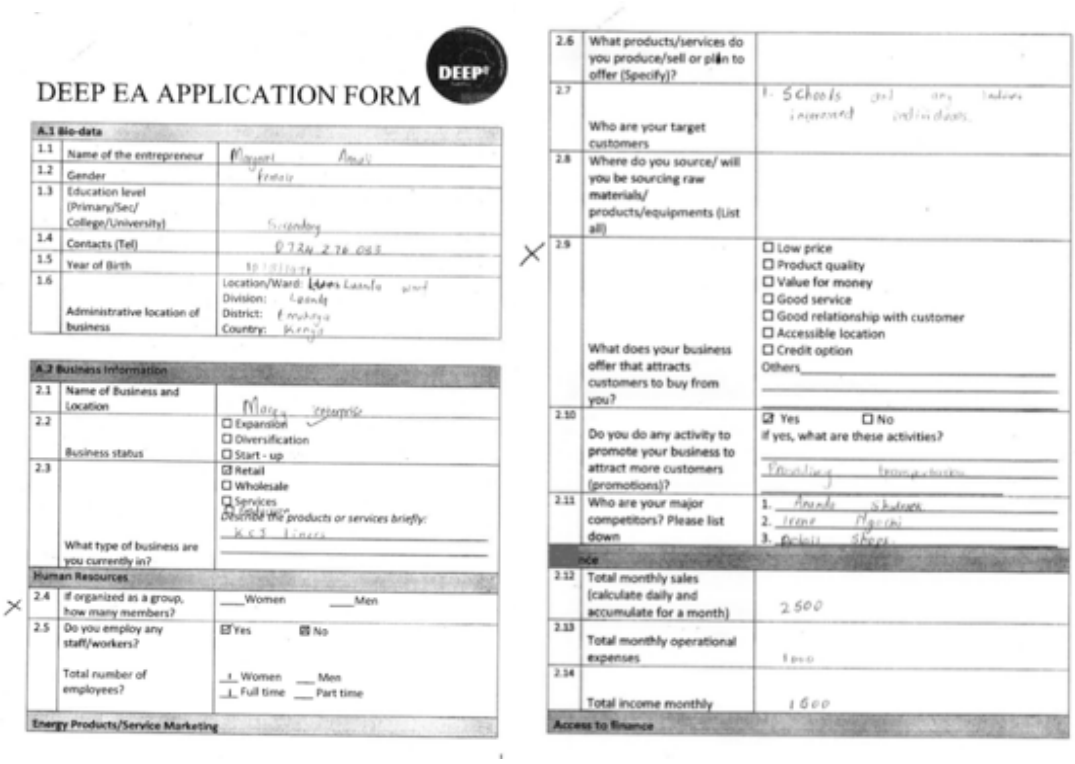
[17] 'Weak' ties are social connections that occur through mere acquaintance with another person, perhaps only on one occasion, rather than stronger and continually reinforced connections such as friendship.

Foundation (MLF), a microfinance organisation headquartered in the UK, was arranged between the London offices of SolarAid and MLF after their respective managers met at a networking event. This led to nine 'solar women' being recruited as part of a pilot project. Staff in the Malawi SolarAid office found that: "it is a favourable scheme so we are looking to extend it, because MLF has detailed selection that identifies the best entrepreneurs."

One of the MLF solar entrepreneurs, Mrs Sofileti Nkhata from the village of Kamphalika in Kasungu district, told me how she was first contacted by MLF officers who visited her village and gave her forms to fill in for a loan. She was told to create a women's group with other women from her village, ending up with a group of 23 who were all given a small cash loan and training in business skills. Before the loan Mrs Nkhata said she had been buying two to three bags of maize at a time for onwards sale. With the loan she had bought 20 bags in one go and scaled up her business. When SolarAid subsequently linked up with MLF, they came back to the village to ask all the women about how they had used that initial loan and how it had benefited them. Those that were judged to have used their loan effectively were selected for the solar entrepreneur programme, with herself and two others from her group making it through. Although MLF asked for various pieces of information such as highest education level achieved, the selection process was regardless of this. She said that she had got as far as finishing Standard 5 of Primary School, which is the fifth year of primary education and is normally completed at the age of 11 years, although she did not specify at what age she had reached it.

Under GVEP's programme DEEP, once the initial encounter with a DEEP recruiter had occurred, prospective entrepreneurs were also asked to fill in an application form (Figure 41). Again this collected general information (name, gender, education level, date of birth and contact details) stored as data but not used for the selection process. It also asked for information about their current or proposed business, including business type, monthly sales and expenditure (if applicable), local sources for necessary materials, and where the finance came from or would come from to start the business. The application form then went on to a skills self-assessment, asking the applicant to rank their skill levels in various business activities such as marketing, book-keeping and legal issues. Lack of these skills did not lead to refusal of an application, however; instead the purpose was to assess their training needs.

Figure 41: First two pages of original DEEP application form as filled in by prospective entrepreneur (crosses in margins made by DEEP recruiter to highlight incomplete sections)



DEEP EA APPLICATION FORM

DEEP

A.1 Bio-data

1.1	Name of the entrepreneur	Margaret Anudo
1.2	Gender	Female
1.3	Education level (Primary/Sec/ College/University)	Secondary
1.4	Contacts (Tel)	0724 276 053
1.5	Year of Birth	[illegible]
1.6	Administrative location of business	Location/Ward: Idiro Lusala ward Division: Lusala District: Emuhaya Country: Kenya

A.2 Business Information

2.1	Name of Business and Location	Mary's enterprise
2.2	Business status	☐ Expansion ☐ Diversification ☐ Start - up
2.3	What type of business are you currently in?	☑ Retail ☐ Wholesale ☐ Services ☐ Others Describe the products or services briefly: K.C.S. Liners

Human Resources

2.4	If organized as a group, how many members?	___Women ___Men
2.5	Do you employ any staff/workers?	☑ Yes ☒ No
	Total number of employees?	1 Women ___ Men 1 Full time ___ Part time

Energy Products/Service Marketing

2.6	What products/services do you produce/sell or plan to offer (Specify)?	
2.7	Who are your target customers	1. Schools and any [illegible] individuals
2.8	Where do you source/ will you be sourcing raw materials/ products/equipments (List all)	
2.9	What does your business offer that attracts customers to buy from you?	☐ Low price ☐ Product quality ☐ Value for money ☐ Good service ☐ Good relationship with customer ☐ Accessible location ☐ Credit option Others_____
2.10	Do you do any activity to promote your business to attract more customers (promotions)?	☑ Yes ☐ No If yes, what are these activities? Traveling [illegible]
2.11	Who are your major competitors? Please list down	1. Anudo Shukuru 2. Irene Agumbi 3. Peter Steps

nce

2.12	Total monthly sales (calculate daily and accumulate for a month)	2,500
2.13	Total monthly operational expenses	1,000
2.14	Total income monthly	1,600

Access to finance

What did lead to applicant selection was evidence that the applicant either had an existing business that fitted with GVEP's definition of clean energy, or an idea for one, along with the necessary materials available locally and some form of capital to get started with. Although GVEP was able to link entrepreneurs to loans, this was only on the basis of some existing business activity needing to be scaled up; if someone only had a business idea and no financial means to kick-start it, they would not be able to participate in DEEP. Financial means, either through having adequate savings or access to money through networks, inevitably equates to agency, and in this case GVEP was unable to address power imbalances against those with neither. This did mean, however, that indebtedness was only encouraged where some level of income was already being earned (a point taken up later in this chapter) and in fact different types of energy businesses were more or less accessible. Making biomass briquettes could require very little financial input as, for example, they could be made by hand out of waste charcoal dust, fine clay and/or another binder. One couple in Uganda said that they took clay for free from the nearby riverbank, paid between 1000 to 4000 Ugandan shillings (24p to 96p / 40c to $1.60[18]) for a sack of charcoal dust and 1200 (29p/48c) for a sack of cassava starch as an

[18] Exchange rates used: £1 = 4,140 Ugandan shillings; £1 = US$1.67

additional binder. They had some additional transport costs, but they could produce more than £10 ($16.70) worth of briquettes with these materials and despite having started with very limited savings had still been able to build up their business.

Selection is also a two-way process: those fitting GVEP's requirements for entrepreneurs were not always interested in being involved, for example if they did not see any benefits of participation. Staff who participated in the recruitment efforts said that existing business people would often ask lots of questions around the possible benefits of joining the project. Sometimes it became clear from their questions that their primary interest was a grant, and if this was not available then they were not interested in DEEP. This reciprocal aspect of the selection process seemed to naturally create an upper limit in terms of business size, with DEEP not appealing to more formal and extensive businesses.

Where people with more established energy businesses have engaged with DEEP, it is as 'associate partners', signifying that they are already seen as appropriately 'marketised'; DEEP support is not offered to their core staff but instead to the new, independent supply chain actors that these partners are recruiting. Similarly SolarAid distinguishes between entrepreneurs and 'dealers', the latter being existing businesses that are already considered capable of selling solar lanterns without additional business training (but technical training about the products is still provided). The development intermediaries have therefore both kept the term 'entrepreneur' for those that have been selected as potential market actors but are considered to require further support to become so. The term is used to give a sense of the entrepreneur's potential ability to establish a successful business, if the development intermediary helps them to acquire the necessary skills, tools and networks to do so.

Examples of other development intermediaries selecting entrepreneurs

Within the fieldwork countries, various other development intermediaries were also using the entrepreneurship concept to establish supply chains for clean energy products. A summary of findings from interviews with some of these organisations in Uganda is shown in Table 6[19]. Solar Sister, ToughStuff and Barefoot have also become 'associate partners' of GVEP so that their entrepreneurs can receive DEEP business training. Additionally Living Goods and Solar Sister both supply

[19] Information about these approaches are from only one interviewee per organisation and were not directly observed, so may be less systematic in delivery than suggested in Table 6.

ToughStuff and Barefoot solar products to their entrepreneurs, showing the interconnectedness of these organisations.

The table shows how the selection process for 'entrepreneurs' varies, with some looking for more evidence of existing entrepreneurial characteristics than others. Living Goods claims to have a very systematic and rigorous recruitment that restricts selection to one woman per community. She must be both nominated by that community and also meet Living Goods' own criteria, including being of a certain age, having good English language and interpersonal skills, and being 'energetic'. Solar Sister has a process that is more clearly based on social connections and trust, recruiting recommended 'anchor' women first and using them to identify trusted women from their existing networks.

Barefoot Uganda, by comparison, is not concerned with particular criteria, but the applicants must be able to pay for their induction. Since this self-selects only those with financial means and willingness, it inevitably restricts accessibility for people really at the base of the economic pyramid. From a market-building point of view, however, it is a successful approach. Solar Sister also asks for a smaller deposit (about one quarter of that taken by Barefoot) to cover the first consignment of stock. All of the organisations provide some business and technical training either directly or indirectly via partner organisations, again highlighting the aspirational nature of the 'entrepreneur' label and the sense of it being something that can be developed with support. In all cases, however, some level of proven agency was also necessary for selection as a market actor in the first instance, be it financial (e.g. training fee for Barefoot, stock deposit for Solar Sister, business start-up capital for GVEP), cognitive (e.g. good level of English required by Living Goods), social (e.g. nomination requirement of Living Goods and Solar Sister) or a combination of these.

Table 6: Summary of other organisations interviewed using entrepreneurship market device

Name	HQ & countries of operation	Type	Focus	Model	Selection for entrepreneurs	Training for entrepreneurs	Financial support to entrepreneurs
Living Goods (Interview 18)	HQ: US Operations: **Uganda**[20], planning Kenya	Registered as NGO but business aspect for sustainability. No donor for energy focus.	Community health	Female micro-franchisees using 'Avon ladies' model.	Thorough nomination and interview (written and oral) → 1 woman per community. Aged 25 to 45, good English, bank account, energetic, good interpersonal skills.	4 to 7 weeks of business skills and product training, free of charge	Start-up kit worth 150,000 to 200,000 Ugandan shillings (£36-£48/$60-$80[21]) provided initially. Partnership with BRAC MFI (which gives loans to women's groups.)
Barefoot Power (Interview 14)	HQ: Australia Operations: **Uganda**, Kenya, Rwanda, Southern Sudan, India. Launching in West Africa.	For-profit social enterprise	Pico-solar product manufacturing and distribution	Micro-entrepreneurs (30% of sales); also dealers (30% of sales), SACCOs, MFIs, NGOs etc.	Application form but don't usually decline applicants.	3 days of business and solar training, ents pay 100,000 Ugandan shillings (£24/$40), total cost is 350,000 (£85/$142). Previously offered it free but didn't work. GVEP helping with training.	None, but hope to link with financial institutions to provide loans (possibly using GVEP's financial linkage system.)
Solar Sister (Interview 19)	HQ: US Operations: **Uganda**, South Sudan. Now starting in Nigeria.	Social enterprise not-for-profit.	Pico-solar distribution	Network of female entrepreneurs: "Solar Sisters", using Avon-style model.	Anchor women recruited first, recommended by people. Then they find other women that they trust. Do background checks with local council and make them sign contract.	Train them how to sell in different ways, in different places etc. Also how to recognise potential markets. GVEP going to start helping with training.	Micro-consignment model. Pay 25,000 shillings (£6/$10) up-front as deposit for first inventory – 10 products, t-shirt, cap – 'business in a bag'. They keep 10% of price they sell at.

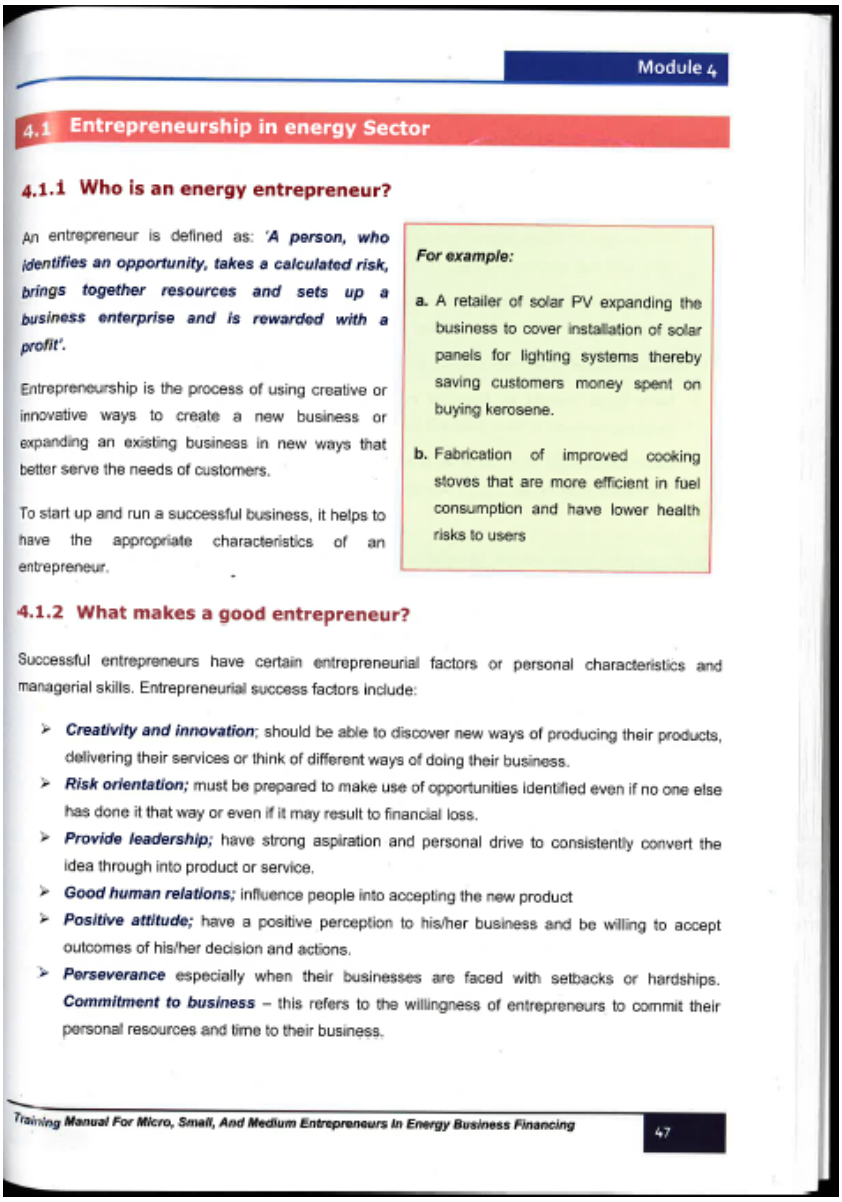
[20] Country in bold denotes location of interview
[21] Exchange rates used: £1 = 4,140 Ugandan shillings; £1 = US$1.67

Name	HQ & countries of operation	Type	Focus	Model	Selection for entrepreneurs	Training for entrepreneurs	Financial support to entrepreneurs
Tough Stuff (Interview 17)	HQ: UK Operations: **Uganda**, Kenya, Tanzania, Rwanda, Madagascar, Ethiopia, Ghana, Nigeria	Social enterprise. Registering in Uganda as for-profit company.	Pico-solar	Partnership with importers that use traditional trade channels – existing shops buy from importers. Also NGO channel where NGOs set up people with 'business in a box' e.g. Living Goods.	Use NGOs' existing networks.	ToughStuff try not to get involved directly with entrepreneurs, except for occasional marketing support. Partner NGOs provide all training. GVEP might also start training some.	None, up to NGO. Importer pays 30% prior to shipping and rest over time.

7.3 Entrepreneur training

SolarAid and GVEP both provide technical and business training for their new entrepreneurs, although because of SolarAid's focus on pre-marketised 'dealers' by the time of the research period, this was easier to observe within the GVEP case study. Under DEEP, the idea of a new recruit being an 'entrepreneur' and thus being expected to have various characteristics and act in certain ways associated with good entrepreneurship is introduced from the start of the engagement and continually reinforced as a key point, with the notion of entrepreneurship being used as a central discursive device when shaping the entrepreneurs for their market roles. The training manual provided to and used for training DEEP entrepreneurs contains an introduction (Figure 42) to how the new recruits are expected to perform their new role.

Figure 42: DEEP entrepreneur training manual p.47 (GVEP International, 2010b)



Module 4

4.1 Entrepreneurship in energy Sector

4.1.1 Who is an energy entrepreneur?

An entrepreneur is defined as: *'A person, who identifies an opportunity, takes a calculated risk, brings together resources and sets up a business enterprise and is rewarded with a profit'.*

Entrepreneurship is the process of using creative or innovative ways to create a new business or expanding an existing business in new ways that better serve the needs of customers.

To start up and run a successful business, it helps to have the appropriate characteristics of an entrepreneur.

For example:

a. A retailer of solar PV expanding the business to cover installation of solar panels for lighting systems thereby saving customers money spent on buying kerosene.

b. Fabrication of improved cooking stoves that are more efficient in fuel consumption and have lower health risks to users

4.1.2 What makes a good entrepreneur?

Successful entrepreneurs have certain entrepreneurial factors or personal characteristics and managerial skills. Entrepreneurial success factors include:

- ***Creativity and innovation***; should be able to discover new ways of producing their products, delivering their services or think of different ways of doing their business.
- ***Risk orientation;*** must be prepared to make use of opportunities identified even if no one else has done it that way or even if it may result to financial loss.
- ***Provide leadership;*** have strong aspiration and personal drive to consistently convert the idea through into product or service.
- ***Good human relations;*** influence people into accepting the new product
- ***Positive attitude;*** have a positive perception to his/her business and be willing to accept outcomes of his/her decision and actions.
- ***Perseverance*** especially when their businesses are faced with setbacks or hardships. ***Commitment to business*** – this refers to the willingness of entrepreneurs to commit their personal resources and time to their business.

Training Manual For Micro, Small, And Medium Entrepreneurs In Energy Business Financing 47

The DEEP training manual suggests that entrepreneurs have some specific personal characteristics, although it proposes that these are 'helpful' rather than 'essential' to starting and running a successful business, in order not to disillusion those who might feel they do not yet have these characteristics. Furthermore, all of the assets listed on the page can be developed and manifested through adopting specific ways of working, rather than being personality traits that someone either has or has not. Again this maintains the sense of entrepreneurship being achievable for all with support and hard work. In this way it also conceptualises entrepreneurship as performance.

Following the description of characteristics, the training manual (Photo 31) provides further indication of what is expected of DEEP entrepreneurs in terms of the activities they should undertake. They are then asked to undertake an exercise to think about what 'entrepreneurial' skills they have that can help them to develop their business, initiating the process of self-reflection and application of the training to their performance as an energy entrepreneur.

Photo 31: Training manuals developed and used by GVEP International (left-hand manual used for DEEP entrepreneurs)

Photo 32: DEEP training session for new Barefoot entrepreneurs

The training sessions themselves are carried out in groups of varying sizes, depending on the specific training event. Grouping people together in order to share from each other's ideas and experiences is used both in training and once the energy businesses are in operation (the utility of this is discussed later on). Photo 32, for example, shows a DEEP training session for newly recruited Barefoot solar

entrepreneurs in Kampala. This was their first of three days of combined technical and business skills training. They were told to firstly develop a business plan that GVEP would help them work on, secondly to put this into practice by using it to develop their solar sales businesses, and thirdly to think about how to get financial help for expanding their business further. They were also told that only six out of every ten new DEEP recruits continue as entrepreneurs, highlighting that it is something that takes hard work and dedication.

Ongoing training: being treated as an entrepreneur

The term 'entrepreneur' features in the majority of conversations about and within DEEP operations: not one day of fieldwork passed without the term being used, and each day it was heard on numerous occasions. The entrepreneurs are very rarely referred to as anything else, except for when their individual name or business name is used, or very occasionally when someone uses 'beneficiary' when talking about them indirectly – using the more traditional non-market language of international development programmes. Calling people entrepreneurs and treating them as professional business people was in many cases seen to be performative in a constructive way: the entrepreneur concept is used as a training and motivational tool to help them perform as such.

After training, the primary contact point between GVEP and the entrepreneurs is their DEEP business mentor. The mentor-entrepreneur relationship therefore facilitates the continued application of the entrepreneurship discursive device over time. The mentors equally have a clear awareness of the entrepreneurship concept, all having a business background (in most cases both university training and practical experience) and a strong, albeit varied, idea of what it means to be an entrepreneur. I asked all eight DEEP business mentors in Kenya and Uganda what they felt were the particular abilities of successful entrepreneurs. Their answers and the number of mentors that mentioned each skill or approach are shown in Figure 43 below.

Figure 43: Entrepreneurial characteristics mentioned by DEEP business mentors

Figure 43 again highlights the repeated narrative of entrepreneurship, with buzz words and phrases such as 'aggressive strategy', 'innovative', 'willing to take risks' and 'focused' all portraying entrepreneurship as an attitude that can be adopted by all. Practical business skills were also seen as important, such as doing 'professional' business activities and undertaking marketing activities. Driving through a town in the GVEP vehicle, one of the mentors pointed out a man painting a sign on the wall of his kiosk and laughingly said: "look at that man, he is putting up a sign to advertise what he sells – he is an entrepreneur". During DEEP, the mentors were continuing to instil in entrepreneurs the sense of what it means to be one and helping them perform as one. They were constantly monitoring their success in achieving this or otherwise, guiding them along the path of what being a successful entrepreneur is taken to mean by DEEP management and DEEP mentors.

When asked how they benefitted from DEEP, just under half the entrepreneurs (13 out of 30, 43%) specifically mentioned the support provided via mentoring. One stove maker in Uganda said he had become good friends with his mentor who visited him each month; outside of these visits he said they also talked on the phone regularly, about work and other things too. The mentors were asked how they would describe their relationships with the entrepreneurs they were responsible for. Extracts of their responses are provided in Table 7 below, with each table row containing the response from a different mentor.

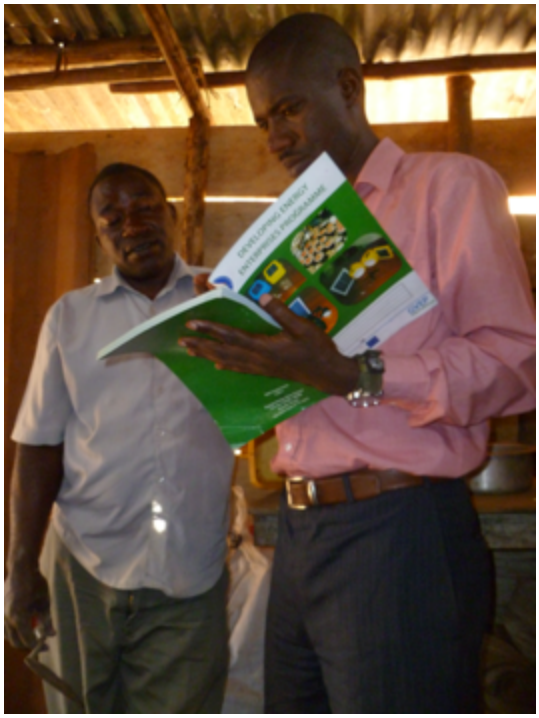
Table 7: DEEP business mentors' comments on relationships with entrepreneurs

Country	Mentor comments on their relationships with entrepreneurs
Kenya	"It's very important that mentors are local. Some entrepreneurs have limited or no literacy. Their expressions are difficult to understand if you're not local. It's important that we can mingle and become used to the clients – some are shy. As mentors we come to understand them very well."
Kenya	"My relationship with the entrepreneurs is very good. We know each other as we see each other frequently. They know that DEEP provides support to them."
Kenya	"It's a cordial, good relationship."
Kenya	"They're our people, we understand each other. I did the initial business training for them so I've known some of them for 1 and a half years, so it's a very good relationship, I know them well. None of my entrepreneurs have dropped out – I had to explain financial aspects, about the lack of grant, but not all of them are about the money."
Uganda	"We speak in Luganda. Some of them aren't strong in English. I don't speak any other local language, so couldn't be a mentor in regions where they don't speak Luganda. I speak Swahili but often people don't trust you if you speak Swahili, especially the older generation, because it is associated with the war and therefore has negative connotations."
Uganda	"I see them each month, but some I've only been seeing for 3 months because before then I was a voluntary mentor in another region. For [name of an entrepreneur], he's become a good friend, we even talk on the phone sometimes about other things besides GVEP. I try to help them out, like getting them orders from wholesalers or shops in town. I got an order for 150 [cookstoves] recently, I gave the order to 2 women [entrepreneurs] as they were earlier in their business and needed it more than others."
Uganda	"The relationship is built over time, but it's only been 3 and a half months so it's still developing. I can't say that I know them really well. Out of 10, maybe 4 or 5."

The mentors suggested that a key determinant of being able to build successful relationships with their entrepreneurs was coming from the same geographical area, or at least speaking the same language: "They're our people, we understand each other." It was noted that this was a specific consideration within GVEP's business mentor recruitment strategy, with an ability to speak the same language being considered crucial: "When recruited they specifically took mentors from the local area who speak the local language. Some of the entrepreneurs don't speak Swahili or English so it wouldn't work otherwise." Some noted that Swahili, Luganda or English may be used with particular entrepreneurs proficient in a second language, or if visitors were there, but generally the local language was used "to make it easier for them [the entrepreneurs]".

Photo 33: Cookstove maker Edward Oliech Gwara in western Kenya with his DEEP business mentor

Photo 34: A DEEP mentor checking the sales figures of cookstove entrepreneur Herbert Bogezi in Wakiso, Uganda



Another evident point from Table 7 is that the mentors felt that the longevity of the relationship was inevitably a deciding factor in the strength of their relationships with entrepreneurs. Due to the implementation of the new strategy, some of the mentors had only been with their current entrepreneurs for about three months. The

frequency of visits varied between one per week and one per month. Most mentors noted that they intended to visit every week, but sometimes it could only be fortnightly or monthly due to the number and geographical spread of entrepreneurs they were responsible for.

GVEP staff also felt that, partly because of the mentor-entrepreneur relationships, the entrepreneurs were responsive to the mentors' hopes and expectations of them performing well. The DEEP financial manger in Uganda described how the entrepreneurs:

> […] often say that by the mere fact that you're expecting a mentor to visit it pushes you to do your best, because they're going to ask to see the records. So it's pushed them into good record keeping, which is really lucky for people at that level. So it's simply that visit that motivates and challenges them and makes them improve.

One of the mentors described: "we give them targets and every month track their growth, then tell them to make a little bit more to meet the next target." An entrepreneur subsequently explained how when he is set these targets by his mentor, he feels he has to meet them so as to not get embarrassed. Another noted that the confidence his mentor appeared to have in him and his business efforts had changed his own attitude: "DEEP supported my confidence - I was very deflated by the poor briquettes I made at first, so I may have given up altogether otherwise." Another mentor said of the entrepreneurs: "Those who've been successful, it's been out of their hard work and constant support from mentors." The strength of the relationship between mentor and entrepreneur, in turn affected by the ability for them to communicate effectively and the frequency of the mentor's visits, are therefore seen as one of the crucial aspects of the DEEP programme design.

It is useful to note that there is no particular translation for entrepreneur in some of the local languages used by the field offices, suggesting that the value of the entrepreneurship concept is not necessarily linked to the specific wording. In Malawi, the women who sell solar with dual support of SunnyMoney and the MicroLoan Foundation are referred to as entrepreneurs in English, but 'wazimayi wamalonda' in Chitumbuka or 'azimayi amalonda' in Chichewa – both simply meaning 'business women' because there is no exact translation for 'entrepreneur' in either language. GVEP staff told me that the Swahili word they used for entrepreneur(s) was 'mjasiriamali' (singular) or 'wajasiriamali' (plural), with 'mali' meaning wealth, possessions or assets, and the full word being similar to "one who works for profit". Although this is not necessarily how entrepreneur would always

be translated in Swahili (a more typical translation again being simply 'business person') its origins within DEEP were unknown and it is possible that a term that particularly elevates the aims of successful business people (working for profit) was specifically adopted for the programme.

Treatment of the DEEP entrepreneurs appears to instil a feeling that with GVEP's support, they can become successful business people. Similarly, the organisations in Table 6 above also operate on the basis that through training, people can be formed into the market actors needed to sell products. Terms such as "Business-in-a-bag" (Living Goods, Interview 18) and "Business in a box" (ToughStuff, Interview 17) are used to denote that, given the appropriate attitude and aptitude, everything needed for someone to become a successful salesperson can be provided by a development intermediary.

7.4 Performing as entrepreneurs

The DEEP entrepreneurs I met were found to have adopted the same market language as their training manuals and mentors used. They could immediately say what their profit margins were and how they calculated it, talk about any quality issues of their products and discuss their customer base and marketing strategy. For example, one briquette maker in Uganda described how his business was doing very well but "there are still challenges that need to be worked on – our manufacturing capacity is not sufficient, the technology we use can no longer match demand." Later he spoke of the business potential if this barrier could be overcome: "Our branding is good, the product is good and the market is there".

A member of a cookstove-making group in western Kenya mentioned how "quality is very important – bad products don't move in the market but good ones definitely will" and how other groups often had not had as much success as them because "lots aren't serious with the work … we recognise this as a good income generating business." The following day I spoke to a briquette-maker who talked about the "niche market for briquettes" but that "competition for resources is becoming an issue". He also described how he gives out samples in order to promote awareness of his charcoal dust briquettes, which he hopes will become his "core business".

These uses of economic terms are not just convenient descriptions but are actually performing the entrepreneurs as market actors. Clearly, adoption of the language of markets is not sufficient in itself for the entrepreneurs to be able to successfully perform a role within their chosen market system. The training applied by the

development intermediaries is also about creating understanding of those terms and concepts and their utility, and ensuring that the entrepreneurs will have the ability and willingness to apply them. For those who were speaking in their local language when I met them, it was not clear if the exact vocabulary used by them was the business language that would be expected, but certainly the business principles asked about or voluntarily mentioned, such as profit margin, seemed to be clearly understood and fluently spoken about. Some examples of discussions about price-setting with the entrepreneurs are given in Box 4 below.

Box 4: Examples of price-setting processes applied by DEEP entrepreneurs

Farouk, cookstoves, Uganda - He takes cost of materials and adds on transport costs plus a profit margin. However, when asked he's not sure how much the profit margin is exactly - it varies depending on the negotiation with the buyer, he has no strict amount. He's very aware of the material costs though and when they change he makes an equivalent change in the prices he sells at.

Mr Mawanda, briquettes, Uganda – He calculates inputs (direct and indirect – transport etc.) and adds about 10% profit. He's going to increase the profit margin over time though as he'll be adding more value as the quality increases.

Edward and Nora Mukasa, briquettes, Uganda – The price depends on the cost of raw materials, then they add 10% for profit. All members in the local area sell at the same price. They sit and have meetings to discuss the price if the material or transport costs change.

Peter Obel and Bibian Obambo, cookstoves, Kenya – The profit margin is a minimum of 20% but can be up to 30%. The price is calculated on the costs of production but then there's some negotiation when they sell so the exact final price depends on each customer.

The DEEP entrepreneurs were also seen to put other advice received during their DEEP training and mentoring into action, like getting their businesses formally registered with the local authorities. Edward and Nora Mukasa talked about their intention and reasons to do this: "Our business is not registered yet, that is the next step, as otherwise we will not be recognised as businessmen. It is good for getting trust, as then we will be known by the local and district council, so customers know we can be found again if necessary."

One of the partner organisation staff involved in the start-up phase of DEEP saw a clear difference between some of the entrepreneurs before and after their training (Practical Action, Interview 28, 2012). "Initially they would all laugh when you told them you're an employee of your business, you need to pay yourself a salary. I told

them not to keep saying you don't have the money for that, as that's what they'd all say. Instead I said, the money needs to come from your business." She noticed that once the entrepreneurs had done their training: "they began to run their businesses as businesses, whereas before they often were just doing it as even as a social thing, not a business." She saw them keeping production and sales records, treating it as a business and keeping money for it, paying themselves a salary and investing the rest back in their business. "So they started to be able to see how their business was working, they could tell you how much they were making – they couldn't do that previously. It meant the businesses were bound to grow."

Adoption of the discursive and cognitive tools of business and markets seems to be an important element in the marketisation process. Insights into this can perhaps be taken from work carried out on religious conversions, in particular Susan Harding's (2000) assertion that "speaking is believing" and that a key part of the conversion process is adopting the religious language of the converter: "The process starts when an unsaved listener begins to appropriate in his or her inner speech the saved speaker's language and its attendant view of the world" (ibid p.34). Findings from this research suggest that similarly a key part of the marketisation process is the immersion of the entrepreneurs in economic language and principles, leading to the partial or full adoption of them for their everyday business activities. In fact in some ways markets could be described as the new religion of development intermediaries. Elyachar, for example, talks about USAID in Cairo 'preaching' about the family being an enterprise and the home-worker being an entrepreneur (quoted in Ismail (2006) p.91).

Scott and Dolan (2009) also use religious assimilations in their observations of South African women talking about the impacts of becoming market actors for the cosmetic company Avon. "Throughout the first stage of our research, the emotive, if not evangelistic, zeal of Avon representatives was striking. Women frequently narrated stories of personal transformation, recounting their journey from the destitution of homelessness, squatter camps, and AIDS-ravaged families to the community of hope and possibility afforded through Avon. Many spoke fondly of the revival-style gatherings, where women were honoured with corporate 'recognition' for their sales and recruitment accomplishments, and were visibly moved by the self-esteem they had gained through Avon." (ibid., p.214)

Of course there were also plenty of examples where DEEP entrepreneurs had much further to go in their market 'conversion' process. Concepts were not always clearly understood or even where they were, not put into practice. Some were only carrying

out their energy business activities part-time while maintaining other jobs, evidently not fully 'converted' into energy product market actors. There were also many that had not separated themselves from their businesses financially, so rather than paying themselves a salary would use business income as personal income and vice versa. Although discursive tools could easily be applied, the ability to use cognitive tools such as price-setting models was often hampered by a lack of information or technical tools, not limited understanding or willingness. Poor record-keeping of raw material, transport and other input costs, for example, limited the possibility of accurately using a 'costs plus profit' model. Furthermore in many cases the DEEP entrepreneurs did not have a calculator, and they certainly did not have resources to do extensive pricing studies as required by other pricing models. Record keeping and the material assemblage to do it is therefore an important component of being able to engage with price-setting models, and indeed many other market concepts or skills require technical tools to be utilised. This is discussed further on in this chapter.

Varying performance of entrepreneurs

Despite evident successes in inducting some of the entrepreneurs into the language and toolset of markets and helping them to believe in themselves as entrepreneurs (as also shown by the reported overall success of DEEP in increasing energy product sales), there was clearly also some disappointment for both GVEP and SolarAid when entrepreneurs did not appear to suitably perform their new market roles.

This was particularly following GVEP's initial strategy of recruiting people sometimes completely new to business. One member of staff outlined the high drop-out rate of the programme, with less than half of the trained entrepreneurs still being involved. Large amounts of money had therefore been spent on training that was subsequently seen as 'lost' – at least in the eyes of GVEP staff. Those dropped entrepreneurs may well have used some aspects of the training and advice received under DEEP for other businesses, with augmented agency to perform a business role within another market system, but since that would not be captured by DEEP monitoring and evaluation such a potential benefit must be entirely discounted. Unless the entrepreneur counted as an additional number on the DEEP records and their sales contributed to the overall tally of DEEP energy product sales, the expenditure was considered entirely wasted.

An example is a youth group in Kenya called 'Jungle Magnetic' (Photo 35) that had been recruited under DEEP to produce briquettes out of waste charcoal dust, yet

were having difficulties raising production levels due to not having any kind of machine, manual or automated, for production. They were even having trouble selling their limited output of briquettes due to a lack of marketing activities. However, their main business of a snake park with a small entry charge for tourists seemed to be doing reasonably well. It seems likely that the snake park had benefited from the business training received under DEEP, but this was hard to confirm and certainly from GVEP's perspective the group was not considered a successful example of entrepreneurship.

Photo 35: Jungle Magnetic group members demonstrating their enterprises: charcoal briquettes (left); a snake farm for tourists (right)

DEEP staff gave various reasons to explain the poor performance of some entrepreneurs. Since one of the parameters for measuring their performance was product sales, inaccuracy of sales data often made it difficult to get a clear indication of performance levels in the first instance (discussed further in Chapter 0). Some of the business mentors attributed relative levels of performance to attitude: "If they have a good attitude then they're successful" and "They can generally meet their needs through their business so are entrepreneurial in that respect. Some are more aggressive than others though."

Another reason offered was that the initial recruitment strategy did not sufficiently look to identify existing agency to perform market roles. Someone having interest and capital to start an energy business was considered adequate and able to be shaped into an 'entrepreneur' by training, but some staff felt that over time it had become evident that this often was not the case. The easiest way to ensure that people did have both the ability and the physical means to run a business was therefore to move away from finding people to develop start-up businesses towards

those that could already demonstrate some success within a market system. As the DEEP programme manager explained: "That's why we've moved away from complete start-ups, just picking people up off the side of the road! Our approach going forwards for recruitment is more criteria and an application form, and properly filtering to get the best ones." Another member of staff felt that this was particularly important in the clean energy sector compared to more traditional sectors such as groceries because: "every family may be a potential customer for energy products, yet they have to be convinced to change their behaviour, that's the major challenge."

Equally SolarAid had had some disappointments with entrepreneurs during the previous phase of local assembly of solar kits. A monitoring report from 2009 found that after a year, 157 out of 227 trainees were continuing in microsolar, meaning around 30% had discontinued (although some were unable to be contacted) (SolarAid, 2009). From focus groups it was found that reasons included female entrepreneurs, upon whom a focus had been placed on recruiting, were unable to continue after training due to family commitments and/or lack of support from their husbands. SolarAid's response to the drop-out rate was to ensure commitment from the local community before training women in future and to implement "a more robust process for selecting the most dedicated entrepreneurs". This had resulted in the detailed recruitment processes undertaken via the MLF partnership.

At the time of research SolarAid had only recently moved away from a donor-funded model to a social enterprise approach and there was often a grey area where the two approaches overlapped. This ended up with 'entrepreneurs' being talked about, but the recruited sales people sometimes being treated more as development 'beneficiaries' with a lack of autonomy. Under an original donor commitment from the Body Shop, for example, the main SunnyMoney salesman in Nkhata Bay, northern Malawi, was continuing to have his shop rent and watchman paid for by SolarAid and received all solar stock on credit. As highlighted by the SolarAid staff, this was not supporting him to become an independent entrepreneur. Luckily in this case he was timely paying back his debts in order to receive further stock and maintain his relationship with SolarAid. However, many of the initial pool of sales entrepreneurs had become untenable as they were allowed to generate excessive debt by continually receiving new stock on credit, despite lack of repayment. A SunnyMoney kiosk in Lilongwe, for example, had to be abandoned because the 'entrepreneur' running it ended up in very large debt.

SolarAid staff recognised that this duality of approach (beneficiary and entrepreneur) was not working and hence increased their repayment requirement for existing entrepreneurs, freezing their stock if debts were unpaid. They decided to stop further recruitment of new entrepreneurs (other than via partner organisations such as MLF) and only use 'dealers' able to buy stock up-front. They were also looking at ways to stop paying the rent of the Nkhata Bay kiosk while still honouring the donor commitment made. One option included paying the remaining funding to the entrepreneur in one final lump sum, on the condition that he used it to build his own shop.

There was certainly also successful evidence of the entrepreneur approach working for SolarAid, however. Mrs Nkhata (Photo 36), the MLF solar saleswoman with limited formal education, said that she had made so many sales that she had ended up being able to build three houses: one in her village, one for her family and one in her parents' village. SolarAid staff told me that she came three or four times per month to the Mzuzu office to buy more stock. Photo 36 shows her holding up the cash receipts from these visits. It was clear that she had been to the office frequently and was very comfortable there, with all of the staff recognising her and engaging in informal chat with her. She said that the two other women from her village selected as solar sellers were likewise still continuing two and a half years after the initial training, but that they also focused on other businesses so were not as successful. Kingsley, in charge of the Mzuzu SunnyMoney kiosk, was also seen to be making regular sales and had additionally become a solar technician, fixing some of the broken products under a separate paid contract with SolarAid. He had also developed some of his own 'entrepreneurial' approaches to increasing sales, such as developing a network of sub-dealers.

Photo 36: Solar entrepreneur Mrs Nkhata showing receipts from repeat solar stock purchases

The key performance indicator for entrepreneurs or dealers for both GVEP and SolarAid is, as with all the other organisations using this approach, the number of sales achieved per person and the rate of growth of sales. GVEP also monitors other data about the size of businesses such as number of employees. It could perhaps be argued that these are narrow indicators, however. A development programme overall may be claimed as successful if many products are distributed in a short space of time, yet it gives no indication of the longevity of the programme. Equally the approach that an entrepreneur is taking to make sales, the consistency of sales, the geographical range of sales, the energy input to sales ratio, the use of business income and so on might also be important factors in assessing entrepreneurs in their roles as market actors. Lessons can perhaps be learnt from monitoring subsistence agriculture programmes where increased yield per hectare has often been used as an indicator of success, whereas yield to energy input ratio would perhaps be a more revealing and sustainable indicator.

The activities of entrepreneurs tend to be evaluated on a personal level and there is little separation between person and business. This is both on the entrepreneur side, with few paying themselves a salary from their business rather than just using income as personal monetary gains, as described previously, and also on the support programme side. At both GVEP and SolarAid, questions were always asked about whether the entrepreneurs and dealers were performing well or not, not whether their businesses were doing well. Staff at GVEP also highlighted that this is often the case more widely in the countries they work in, with small businesses seen as the activities of individuals rather than entities in their own right and therefore not necessarily being attractive to others such as their children to take over. GVEP

was therefore keen to monitor the age profiles of their DEEP entrepreneurs as if there was a predominance of older people the programme's impacts could have limited longevity. It is possible that this individualistic nature of small businesses is a more general characteristic of informal economic activities, but further research would be needed to ascertain this.

The value of entrepreneurship as a 'discursive device' has been seen for development intermediaries that use it to demonstrate and entice the artisans and sellers they support into performing their market roles, giving them confidence and motivation through strong mentoring relationships and useful language and cognitive tools. However, this is clearly not enough in itself. Some recruited entrepreneurs perform better in their expected roles than others, with a whole array of factors influencing this and depending on the metrics used to measure performance; limiting recruitment to those that appear to have dedication and inherent 'entrepreneurial' characteristics and instincts seems to unfairly simplify the complex reasons for people becoming effective market actors or otherwise. As one DEEP mentor commented:

> The environment and finance can affect them too. They don't have any money for when times are difficult, so if they struggle or aren't successful it doesn't mean they're not a real entrepreneur.

Table 8 shows the success factors of other entrepreneurs undertaking energy product sales as stated in interviews with these organisations. The respondents of all three organisations cited the importance of existing networks, along with marketing techniques to persuade buyers. Financial experience bringing competence and access to capital also appeared to make a difference, helped by a reasonable level of education. These findings have led to the organisations tailoring their recruitment strategies as described earlier (Table 6).

Table 8: Success factors and sales figures for other development intermediaries distributing clean energy products in in Uganda

Development intermediary	Success factors	Sales figures
Living Goods (Interview 18)	Enterprising ones add in own capital and build it up more quickly. Most successful are above 35 already with a network e.g. been in other women's organisations, table banking groups etc. Also women with small family, more educated (at least O level) and long-term bank account/own savings (more financial literacy), and those with natural marketing skills.	Solar – about 3 sales/month/franchisee (up to 800 women total) Cookstoves – about 3 sales/month/franchisee (about 200 women total)
Barefoot Power (Interview 14)	Difficult to categorise who is most successful, but motivation is key. Entrepreneurs have to go through calculations and teach customers that solar is more economic in long-term vs. kerosene. About 5 to 10% drop out due to capital issues or other commitments. Chains keep growing as entrepreneurs start to sub-deal, and recommend friends etc.	150 entrepreneurs, total sales not disclosed. 21 service centres across Uganda.
Solar Sister (Interview 19)	Use social networks to grow sales. Neighbours trust them as they know them. Also Sisters use products themselves, others see it and want it. Many are primary school teachers, this is a very rich avenue, they take 5 mins after class to show kids, then kids go to parents. Most successful sellers have a little bit of education and may already have a small shop, so experienced with money. Also they have good ideas like selling solar when people come to buy candles.	Sisters should always have 10 lanterns when they go out. Sales target is 10 per month, best performing sell 15, others target 5. If they've not sold enough they get taken off programme. Currently have 123 Sisters in Uganda. Want to grow to 500 by end of 2012.

In essence these organisations have found that the best performers, on the whole, are those who already demonstrate potential agency as market actors, particularly through cognitive, network and financial abilities and resources, hence their recruitment strategies now try to 'cherry pick' people fitting those descriptions. However, it does lead to the question of whether supposed 'BOP' approaches are in fact engaging BOP entrepreneurs or are instead favouring those already able and well placed to run a business. If only the latter strategy had been adhered to from the start in GVEP and SolarAid's programme, many of their 'successful' entrepreneurs may not have been selected at all. However, management from Barefoot Uganda tackled criticisms that they were not offering income opportunities to the poorest by noting that the supply chain still often then developed beyond Barefoot's own recruitment.

> Over time we realised that the people we started with were mostly secondary/primary school drop-outs, whereas now we train secondary/university

> graduates and even other business people already well established, so it's a learning curve. We're not exactly moving away from the BOP [bottom of the pyramid] because they're still taking the energy services to the grassroots and still spreading the chain further. We recently trained a uni graduate for example, but they're then training other people at the grassroots, so the chain keeps growing. (Barefoot Power, Interview 14, 2012)

The agency of a market actor comes from being a socio-technical assemblage, closely bound up with other humans, material objects, information and techniques, and affected by the constant changes that alter that assemblage. It is not a static or prescriptive form, so if an applicant entrepreneur cannot demonstrate some particular component it may not be a critical or permanent omission, but the recruiting agency may decide not to take that risk. Equally, however, those that may appear as ideal actors for a specific market on paper may not choose to, or may be unable to, perform that role for various reasons. The processes of marketisation are unique for each actor, so that there can never be a perfect recruitment and training strategy. There was no evidence, however, of any discussion about approaches to establishing entrepreneur-based distribution chains between the various organisations interviewed for this research. This is perhaps an area where more exchange of experiences would be beneficial, if the competitive relationship between such organisations could be negotiated.

Further discussion of some of the social and technical components of the marketised actors in these case studies is provided in the following sections.

7.5 Entrepreneurs, tools, techniques and facilities

The training of entrepreneurs inevitably has limited utility if they do not have access to the necessary technical tools to make or sell products. These range from tools such as calculators to help make profit calculations and telephones to communicate with suppliers and customers, to the equipment associated with actually making products such as briquettes and cookstoves. Behind each tool or piece of machinery there is as much history of reiterative processes of problematisation, design, qualification (to use Callon's term), valuation and so on as the final energy products themselves. Without going into the details of these processes (since this has been done in the previous chapter) some observed highlights are given here.

Although some aspects of the energy products can be made by hand, such as biomass briquettes and clay liners for cookstoves, the quality and rate of production can be increased by using specifically designed tools and techniques. The metal

moulds used to make clay cookstove liners more efficiently and of the right size, shape and thickness to fit pre-made cladding is one example. Rather than starting to design tools for this purpose from a relatively 'blank canvas', as might be the case where advanced product manufacturing facilities are available, many of the tools seen in use by DEEP entrepreneurs were adapted from other tools that were already available locally. For example, in Photo 37 (left) Edward and Nora Mukasa use an 'omulawo' (stick) and 'kasepikyi' (bowl), commonly used to make 'posho' (maize meal) in Uganda, to mix charcoal dust, cassava starch, clay and water together for making into charcoal-dust briquettes. They also had a meat-mincer that had been adapted for making briquettes out of the resultant charcoal dust mixture (Photo 37, right). Because of its design, the briquettes come out in tubular shapes instead of the round shape of hand-made briquettes.

Another DEEP entrepreneur had designed the adapted meat-mincer for briquette making; he had then extended his business into making and selling these tools. Other entrepreneurs also made their own tools depending on their needs, or modified designs that GVEP technical trainers showed them. Most of those making cookstove liners, for example, fired them in kilns made of brick and cement, but one entrepreneur, Farouk, stood out for having created a kiln from oil drums and sheet metal; these materials were more readily available in his area (Photo 38, left). Edward and Nora Mukasa were also keen to tell me that after being trained by GVEP in how to make drying racks for briquettes, they made their own using a modified design to make them stronger (Photo 38, right). The GVEP trainers were in turn able to learn from this modification and pass it on to their other trainees.

Photo 37: Edward and Nora Mukasa in Uganda with omulawo and kasepikyi (left) and meat-mincer adapted locally into a manual briquette maker (right)


Photo 38: Kiln for firing cookstove liners made out of oil drums and sheet metal (left); briquette drying racks made to be stronger than the design shown by GVEP (right)


Of course, none of these technical tools can serve their intended purpose without a basic level of ability to use them appropriately. Having access to relevant information and an opportunity and cognitive ability to develop proficient technique is therefore key, with these being further components of the socio-technical assemblage that gives a market actor their agency. Under DEEP, a huge focus was placed on training the entrepreneurs in practical skills. Techniques were always as individual as the energy products themselves, never being exactly the same in two places, and many different levels of sophistication and efficiency were seen and constantly being developed. In the same way that makers of tools could then sell these as an added business component, those with proficient techniques could become training providers. Their services would be subject to the same processes of qualification, valuation and price-setting as any other market good.

For each type of energy product there was a hierarchy of equipment from tools used to help make products by hand, to hand-powered machines (such as the converted meat-mincer) to full ensembles of automated machinery. Entrepreneurs were able to climb this technical ladder when they set aside enough profit for the next investment or obtained other sources of finance. Each new level of automation led to higher output levels and a greater impression of business sophistication and formality, increasingly far from the basic set-up of individual artisans making products by hand.

Photo 39: Ugastove clay mixing using a conveyor belt and automated mixer system

Photo 40: Ugastove metal cladding manufacturing

For cookstove manufacturing, the most sophisticated tools I saw were at Ugastove in Kampala where conveyor belts and automated mixers were used for clay mixing (Photo 39) and large clamps and automated sheet metal cutters for shaping the stove cladding (Photo 40). This business was deemed advanced enough to be taken on as a DEEP partner, so GVEP was helping to train their independent sales representatives.

Another interesting aspect of Photo 40 is the evidence of safety equipment, again something less common in the smaller, less formal businesses. Some briquette makers, for example, mentioned how mixing charcoal dust was notably bad for their health and that therefore they avoided doing it on a windy day, but although investment in dust masks was seen as a viable solution it was not a priority. The reason for ear defenders being used at Ugastove was likely to be partly due to its registration as a carbon finance project, which would have brought with it various stipulations such as concerted efforts to ensure safe working environments. Photo 39 and Photo 40 also highlight another key material feature of energy product businesses: the premises available for undertaking activities. The location and size of the facilities make a huge difference to the potential for manufacturers to install and operate their equipment, and store materials and part-built and finished products.

Similarly, product sellers need somewhere to store and possibly display stock for sale. 12 out of 30 (40%) DEEP entrepreneurs spoken with, for example, cited space and facilities as key limitations, particularly for cookstove liner makers and briquette makers who needed to let their products dry out but were often unable to do this outside because of rain. One cookstove liner maker in western Kenya explained that they had been forced to limit their production of cookstove liners because of storage issues. Already their adult children had needed to move out of their sleeping rooms because they had been taken over for liner storage (Photo 41). Added to this are the services that facilities require, such as lighting and an electricity supply if automated machinery is going to be used. Given the energy access situation summarised in Chapters 5, this can often be a limiting factor to the level and type of automation able to be achieved.

Photo 41: Room previously used for sleeping taken over for drying cookstove liners

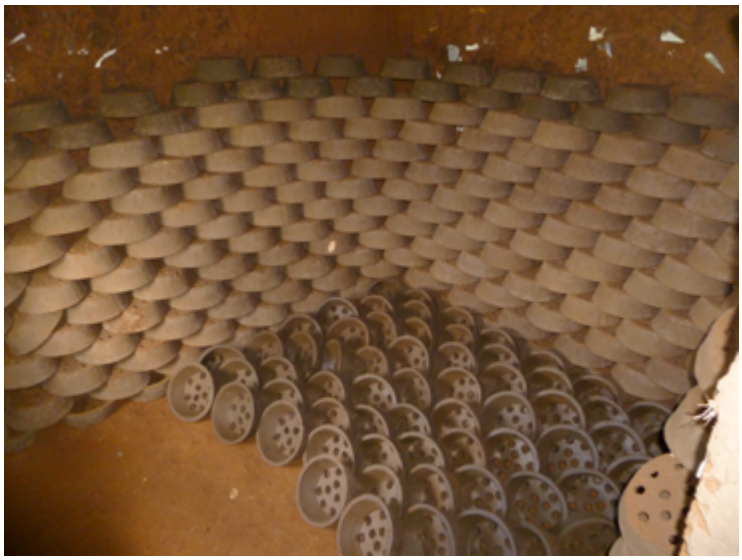


Photo 42: Solar phone charging records, Uganda

Tools are not just necessary for making things or protecting people when doing so, but also for allowing market actors to perform related aspects of their roles. Their agency as market actors overall is again affected by what tools and information they have access to. In the discussion above, the difficulty in setting prices was often hampered by a lack of records. The simplest material objects of a notepad and pen for recording data such as sales over time generated vital information to feed into pricing and other economic models. Photo 42 shows a solar phone charging entrepreneur's sales records, used to calculate his monthly income and the payback of his solar system over time.

A significant recent example of technology enhancing agency, particularly for those working in the informal sector in African countries where there may be limited access to land-based communication infrastructure, is mobile communication devices. The high and rapidly growing levels of mobile phone ownership in Africa and the impacts on business activities have been discussed in Chapter 2, and throughout the fieldwork these technical devices were reinforced as key for entrepreneurs to give and receive information and build and maintain relationships with suppliers and consumers. Their utility also went beyond communications with phones being used as, for example, visual aids, information storage, calculators and mobile banking devices. Photo 43 shows a DEEP entrepreneur in Uganda, Mr Herbert Bogezi, being shown a photo of other cookstoves on his DEEP mentor's Blackberry. Phones had even become essential for the case study programmes overall, with DEEP mentor-entrepreneur meetings always being set up by phone and these crucial relationships being maintained by phone outside of personal visits.

Photo 43: DEEP mentor showing a DEEP entrepreneur a photo of other stoves on his Blackberry

Living Goods summarises the key role of mobiles for their female entrepreneurs on their website: "Simple phones are quickly becoming the single most transformative tool for our success: empowering our agents to earn more, delivering targeted health messages, dramatically lowering our cost to market and monitor, enabling real time salesforce management and igniting social connections that drive impact and business success." (Living Goods, 2013) They note, for example, that sales representatives give their number to every customer so that they can call and request a home visit any time they need. Similarly GVEP and SunnyMoney

entrepreneurs were observed to frequently talk with both existing customers and prospective customers on their phones. One SunnyMoney saleswoman explained that she would often receive calls from people who had obtained her phone number from her friends and other clients; they would call her to arrange coming to her village to buy a solar lantern next time they were passing.

Many of the entrepreneurs in Kenya and Uganda also said that they often used M-Pesa (Kenya), MTN Money (Uganda) or competing mobile money transfer systems. None said that they had received payment from customers in this way, but some had paid suppliers of materials or stock. A survey by Gallup (Godoy et al., 2012) found that mobile phone-based transactions are now widely used to send domestic remittances in Kenya and to a lesser extent Uganda, reflecting the fact these two countries (along with Tanzania) "have three of the most developed mobile money markets in the world" (p.23). As shown in Figure 44, in Kenya, 90% of the survey respondents who had sent money domestically in the previous 30 days had done so via a mobile phone; this was also the case for 68% of Ugandan respondents. During the time of research there was not yet a widespread mobile money transfer system in Malawi, but this is likely to change in the near future.

Interestingly, Godoy et al. also show in Figure 45 that rather than being an elite technology, mobile money transfer services in sub-Saharan Africa are used relatively evenly by rich and poor. By comparison, banks are used much more commonly by rich sub-Saharan Africans than by poor, illustrating the relative inaccessibility of formal banking facilities by comparison with mobile phones.

Figure 44: Channels used to send domestic remittances (most recent transaction) (Godoy et al., 2012)

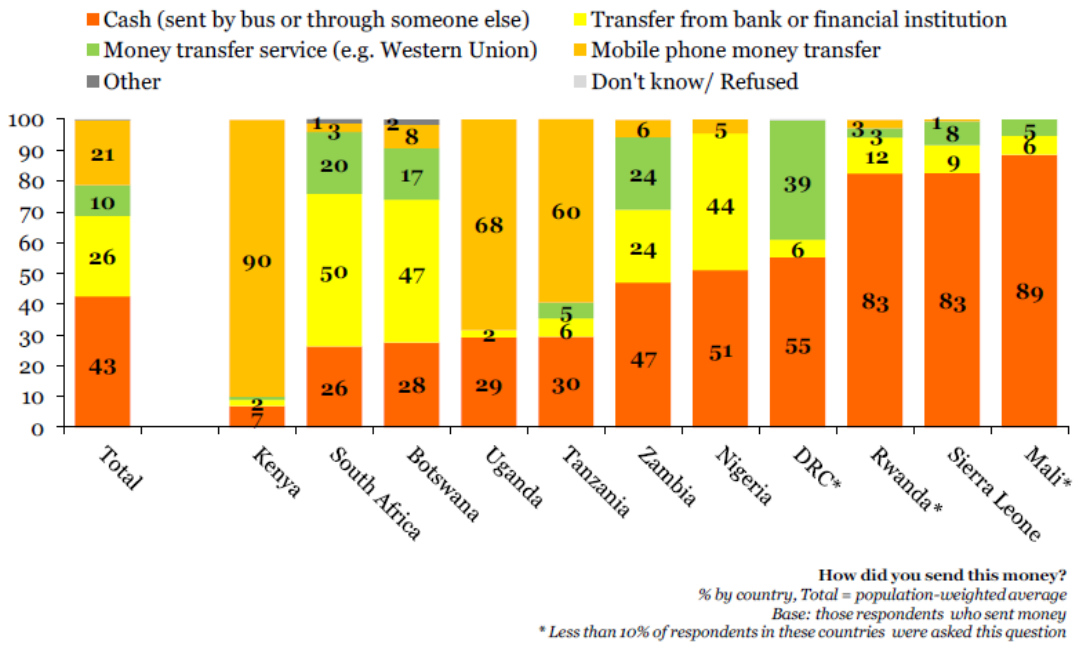
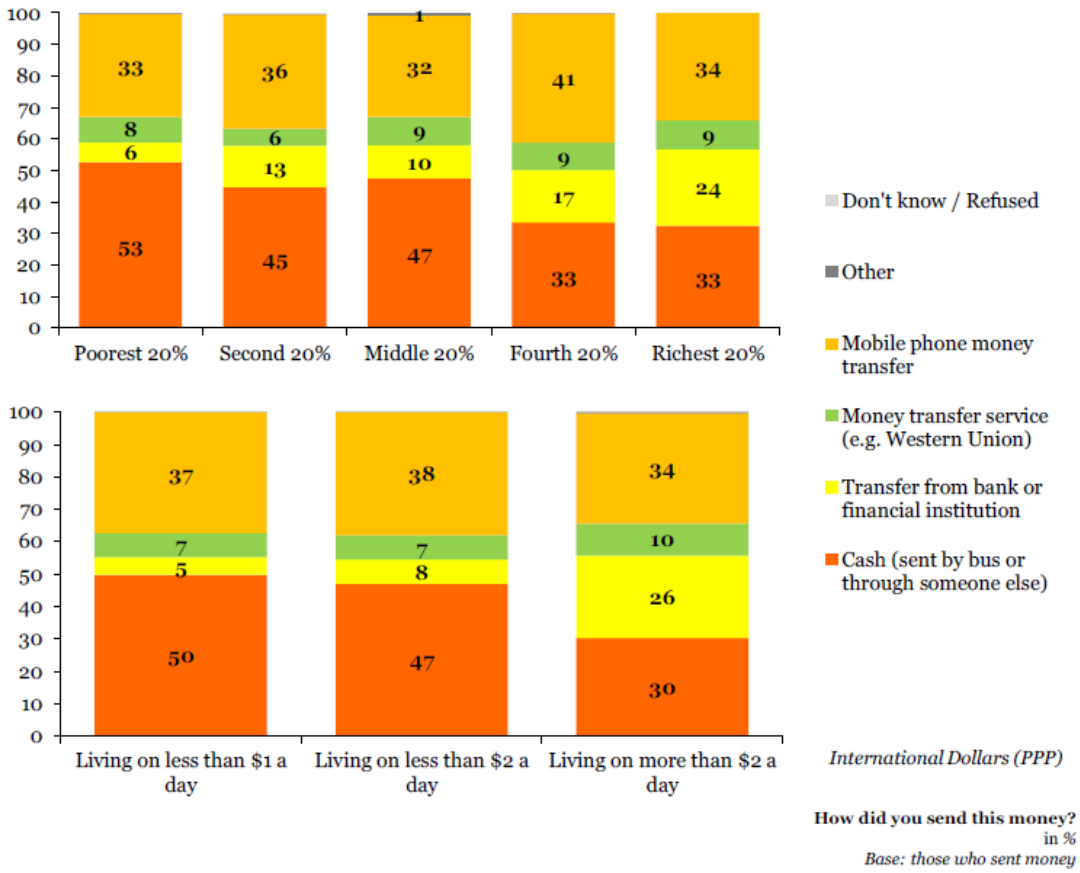


Figure 45: Channels used to send domestic remittances across income groups (same countries as Figure 44) (Godoy et al., 2012)



This importance of mobile phone technology also offers myriad new opportunities for 'entrepreneurs' looking to provide related services. Obviously mobile phones become defunct without battery power to run them, providing DEEP solar phone charging entrepreneurs in areas without electricity grid connections with numerous customers (Photo 44).

Photo 44: DEEP entrepreneur in Uganda receiving payment for charging a mobile phone from his solar system

In the same way that there is a hierarchy of more advanced tools, machinery and facilities for making products, there are always more extensive materials and technologies to be engaged with more generally. Having talked with a SunnyMoney entrepreneur about how she would find new customers, I left her to talk with SolarAid staff. One of them later remarked that the entrepreneur had subsequently said to her: "Ask that lady to buy me a car, so that I can move about to sell more!"

7.6 Entrepreneurs and their social networks

In addition to tools and techniques (both material and cognitive), connections with other humans are a fundamental component of market agency. The connectivity of the entrepreneurs and the characteristics of the networks they are already embedded in form part of their ability to perform the entrepreneur role. This agency is by no means static, however, as the making of new connections or breakdown of existing ones (e.g. through a perceived breach of trust) will undoubtedly occur over time. A focus in both development and entrepreneurship literature on the possible benefits of social networks mean that they have often been termed as 'social capital'. Similarly, initiatives to sell products to people at the bottom of the economic

pyramid (BOP) often acknowledge the opportunities available from harnessing the social capital of BOP entrepreneurs. There are some strong critics of such approaches to render social relationships 'economic' in this way, however, such as Elyachar (2005) who uses the term 'dispossession' to describe how microenterprise initiatives in Cairo 'appropriate' the relationships on which the poor rely to survive and arbitrarily incorporate them into market development projects.

Both of the case study initiatives are equally relying on this aspect of their entrepreneurs' agency as market actors in order for clean energy products to reach as many people as possible. SunnyMoney entrepreneur Kingsley, for example, said that as well as selling from the kiosk in Mzuzu market, when he does not have many customers he moves around town to visit different offices. In the evening he also makes some home visits. He arranges the visits via friends and previous customers who let him know when people are interested. He does get people walking past his kiosk in the market and stopping, but its location in the food market is not always so good for that and often it is when people have already been told where to go to buy a lantern. One evening I visited the homes of some of the customers in his local neighbourhood to see their solar lights in action. The description of how they came to buy their lights is shown in Box 5.

Box 5: Visits to some of Kingsley's solar lantern customers in his neighbourhood

Mr Daudi Matola in Massasa has a Barefoot Senior Powerpack (4 bulb system) that he bought 2 months ago. It's his first time to have a solar product. His son is a friend of Kingsley's and has a Barefoot Firefly (one bulb desk lamp).

Mrs Enala Chirambo in Chiwanga also has a Senior Powerpack. She bought it last year in December 2011. Her daughter is the owner of the kiosk that Kingsley uses. Her neighbours don't have solar, but one guy has seen her system and now wants the same – he's asked to be introduced to Kingsley.

Mrs Nyirongo again has a Barefoot Senior Powerpack. She's a neighbour to Kingsley. Another neighbour also has the same one and some more have been asking – about two or three more people seem likely to buy.

Mr Mhone has a Barefoot Senior Powerpack. He saw the same system at Kingsley's house then decided to buy one too. One person from work has already asked him about it and is thinking of getting one.

All of the customers in Box 5 were found through Kingsley's existing social networks. The customers' social networks have then been recruited into the ongoing quest for more customers. That is not to say that existing networks are his only sales

channel, and it is likely that it was easier to arrange for me to visit those customers with whom he has frequent contact. He did acknowledge some passing trade from his kiosk and new connections made through office visits, and he was unaware of many connections until they came to him to buy a lantern. However, Granovetter's (1982) 'strength of weak ties' concept is evident here, as well as the principle of 'social capital' more generally.

During the research, I was given many examples of social networks being used for both finding customers and for recruiting onward chains of sellers. Kingsley had started using some of his friends as sub-dealers on an informal basis. If his friends found buyers, Kingsley would split the sales profit with them. His friends inevitably had access to more people who Kingsley might not otherwise reach (again invoking the 'strength of weak ties'). However, Kingsley had access to the products, and both Kingsley and his friends were incentivised to utilise those connections through the profit available.

Another example of a friend being brought into a supply chain was seen in the coastal region of Kenya: a woman in a shop in Mariakani, Lucy, was selling d.light solar lights that she was buying from a friend who worked for Total, the petroleum company that had started selling pico-solar products at their garage forecourts. Although it was not an arrangement that Total necessarily knew about, she bought them in bulk and sold them for a small profit. Another example was a charcoal dust briquette seller in Uganda, Mrs Margaret Kisakye, who had started her business after her friend attended a DEEP training event and gave her the information about it. She joined herself and subsequently received the training in 2009. Since then she had trained over 50 other briquette makers, around 30 of whom then also become DEEP entrepreneurs. Mrs Kisakye said that these people had originally been a mix of friends and customers.

Photo 45: Mrs Margaret Kisakye (left), a briquette maker from Masaka, Uganda, with one of the 50 friends and customers that she trained to make briquettes

Perhaps the key question being posed when recruiting entrepreneurs should therefore be 'how well connected are you?' instead of 'are you motivated and entrepreneurial?' The Solar Sister method (Table 6) of recruitment described earlier is one example: 'anchor women' are nominated and they in turn recruit other sellers they trust from their existing networks. The US cookstove manufacturers Envirofit were also overt about their use of social ties to set up distribution channels in Kenya. The head of their distribution partner in Kenya, East Africa Energy, specifically stated: "Team leaders with very good social networks are recruited" (East Africa Energy, Interview 6, 2011). These people then quickly find distributors, with the aim of disseminating both the product and a share of sales profits to the "bottom of the hierarchy". During the pilot phase of this approach they said that they had never seen such demand for a product, quoting the example of one team leader who from a standing start had sold 800 stoves in four weeks, simply utilising her networks. She subsequently had a significant backlog of orders.

The debate in academic literature around the ethics of 'appropriating' poor people's social networks in order to sell products offers several arguments against it, such as inadequate recompense (Elyachar, 2012). This particularly addresses imported products that do not offer the added benefit of local manufacturing. Although SunnyMoney imports solar lanterns, it was clear that solar entrepreneurs such as Kingsley, and the sub-dealers who he has in turn recruited through his network of friends, are incentivised to sell products to their existing social networks because of the profit share they gain. This acts as financial recompense for the 'marketisation' of their social infrastructure. In Kingsley's case the sub-dealer recruitment was

organically grown out of Kingsley's own initiative, not out of any pressure or suggestion from staff at SolarAid, suggesting that the financial incentive is enough to promote entrepreneurs into using their existing social ties. That is not to say, however, that his training from SolarAid might not have helped the idea form, or that the sales they achieve will not end up being incorporated into SunnyMoney's performance data. Furthermore, the entrepreneurs in these case studies were also seen (and indeed encouraged) to find new consumers by making many more connections than just relying on those within their existing social networks, limiting the argument for 'dispossession' in those cases. In fact, it is not inconceivable that some of those new or newly strengthened relationships may end up enhancing the agency of the entrepreneurs in ways that extend beyond the market context in possibly beneficial ways.

The organisation Living Goods has put forward the argument that in order to maximise the efficiency of micro-distribution approaches, product distributors looking to target the poor should merge their efforts into one combined channel: "Innovators in health, energy, and agriculture often fail to scale because they try to build new distribution systems solely for their one new product." (Living Goods, 2012) This was also made clear in an interview with the manager of their Uganda office: "Energy products is an emerging market in Uganda, one of the best ways of reaching clients is using systems like Living Goods' as we have a network to the grassroots – you can see it growing over time." (Living Goods, Interview 18, 2012) Indeed, many product manufacturers such as ToughStuff are realising that the human infrastructures have already been established and 'marketised' by other organisations so their primary distribution method is to look for entries into those.

As well as individuals and their social capital, SolarAid use other nodal points in order to harness existing networks. One example is large working estates, such as coffee, tea and tobacco farms. Schools are another increasingly important market entry point within their sales strategy. SolarAid is not the first to use schools in this way. Cross and Street (2009), for example, note that: "Unilever envisaged schools as 'entry points into communities' and schoolchildren as 'change initiators' who would convey the Lifebuoy message to adult consumers in their homes." (ibid., p.5) This approach has apparently been highly successful and after a successful pilot project on Mafia Island in Tanzania has been rolled out across SunnyMoney's East African operations.

In the country contexts in which this research was carried out, it was also evident that religious networks were of huge importance and many social ties were often

made or reinforced via activities such as church attendance. One DEEP cookstove entrepreneur from Uganda, Herbert Bogezi, told me that the month before he had been on a trip to South Sudan to train people there on making cookstoves. The trip was facilitated by a community-based organisation there that he had been put in touch with through a friend in the Lutheran World Federation. Religion was a regular topic of conversation between staff of the development intermediaries and often mention of their own contacts would be followed by 'from church' or 'who prays at the same mosque'.

Risks and inadequacies of 'social capital' approaches

Social capital should not be over-emphasized, however, particularly if Meagher's (2005) warning against undue emphasis on the utility of 'social capital' for fostering economic growth and regulation is heeded. Two aspects of this argument became clear from the research. Firstly, by no means were all sales or other supply chain connections always made through ready-made informal social networks, as indicated above. Secondly, where more personal ties were relied upon there were often associated complications.

Regarding the first point, nearly all of the entrepreneurs were undertaking some efforts to market their products to new audiences, such as through going to physical marketplaces to sell, positioning their main business location to attract passing trade, advertising with flyers, or by making door-to-door visits to both homes and larger hubs such as churches, schools and offices. Many DEEP entrepreneurs making briquettes, for example, said that they would hand out free samples, while those selling larger products would give demonstrations. Herbert Bogezi, the cookstove maker in Uganda mentioned above, had deliberately located his workshop at the side of a main road and he sold most of his portable stoves to passers by. However, at the time I visited him, he was having to move his premises back from the road due to it being widened. He was therefore in the process of making a large sign to put at the roadside instead.

It would be unfairly limited to suggest that artisan manufacturers in the informal sector in African countries are restricted to harnessing their existing social ties. Various DEEP entrepreneurs were also managing to distribute their products via wholesalers including hardware shops, small supermarkets, and independent market vendors. Another cookstove maker in Uganda, Farouk, estimated that he had established around 100 wholesalers by the end of 2011, having started his business in 2007. He explained that he had to go looking for them and present and

explain his product to each potential new wholesaler. Often he found that their main interest was price.

Mrs Margaret Kisakye, a briquette maker in Uganda, described how she makes house-to-house visits and goes to local council meetings, handing out samples at both, and also distributes business cards that she has made for her business (Figure 46). She often combines these activities with her existing social networks, however, as friends will suggest she visits their neighbourhood. There is not a clear distinction between different levels of personal connectivity, nor does this appear necessary, and again it is the complex web of people, physical artefacts (including briquettes, business cards and mobile phones) and the interactions between them that leads to her finding new customers.

Figure 46: Business card produced by DEEP Briquette Entrepreneur in Uganda

It is not simply the existence of networks between actors that is important, but how those network connections actually operate, such as through trust or asymmetrical power relations. When buying products, consumers are effectively asked to trust the seller. Prospective consumers need to be persuaded of the benefits of a product before buying it, with a good seller helping them to visualise themselves using it and enjoying the benefits it will bring. The existence of a trust-based relationship can significantly help that persuasion process. In most cases there appears to be limited trust extended in the other direction, however. Only two entrepreneurs out of thirty said that they ever offered products to customers on credit. Others had had to stop after debts were not repaid, and the few exceptions were in the case of long-established relationships with wholesale dealers who were known to pay once the goods had been sold on.

On the other hand, cookstove entrepreneurs often took large orders for goods to be made on commission on a verbal, 'cash-on-delivery' basis. When I asked one liner maker, Edwards Gwara in Kenya, if he would consider introducing written contracts for such large orders to reduce associated risks, he replied that it was not

necessary because he knew the customers well. If he suddenly asked them to sign a written contract, he said, they would think he had lost confidence in them and that would be detrimental to the relationship. Furthermore, the tools required to generate a formal contract in the first place (i.e., to produce enforceable written legal documents) are not readily available to most entrepreneurs.

The market devices such as warranties and standards that have been discussed in Chapter 6 also represent ways of formalising otherwise mostly informal transactions between sellers and buyers, through establishing apparently binding rules set out in legal documents. These are attempts to move away from verbal trust-based contracts that are perhaps more easily broken. However, where warranties cannot be utilised or have no meaning for the buyer, it leaves a void between the formal and informal. The need to ensure products are high quality and their usage instructions explained well to new customers are more key than ever, therefore, as losing trust amongst these consumers could be much more significant than in fully formalised markets. During a trial of new pay-as-you go solar products that was highlighting some issues with the design, the SunnyMoney entrepreneur involved in the pilot remarked: "People need them very much, but if they see these problems they'll be afraid and won't buy." During DEEP training, the entrepreneurs were taught to be conservative with the statements they make about their products. "For example, tell people a solar lantern will last 4 hours, even if it has been proven in a laboratory to last 6, because people will test it."

The appropriation of social networks by development intermediaries for economic purposes is also seen as worrisome if it means that the trust that had been established over time between people is jeopardised. Product manufacturers or the development intermediaries importing them that are specifically advocating sales amongst the poor's social networks could perhaps be argued to have a heightened duty of care to make sure that the goods are reliable, for the sake of the marketisation project and for the sake of the entrepreneurs drawn into it. Strong relationships, on which those at the 'bottom of the pyramid' might rely for survival (Elyachar, 2005), could be put at risk if those products break or do not function as expected without avenue for resolving the problem. Since GVEP's strategy is to be product neutral by not promoting any specific manufacturer, this was not an issue for the DEEP case study. As the importers of solar lanterns and distributor of them into 'BOP' networks, however, SunnyMoney does hold this responsibility to some extent.

One example of the adverse impact that can be caused was where a member of SunnyMoney staff had visited her aunt's village around two hours from Mzuzu to sell some solar lanterns. However, for various reasons there had subsequently been problems with a few of the systems. Without any permanent SunnyMoney sales representative in the nearby area, the burden had been put on the aunt to resolve these problems that were seen as her responsibility. She had managed to bring some of the faulty products back to the SunnyMoney Mzuzu office on one of her visits there, but had only been allowed to leave them for fixing and several months later had still not received replacements. When we visited her village at a later date, she was clearly frustrated by the delayed response and her trust in her niece and her neighbours' trust in her recommendations had been called into question.

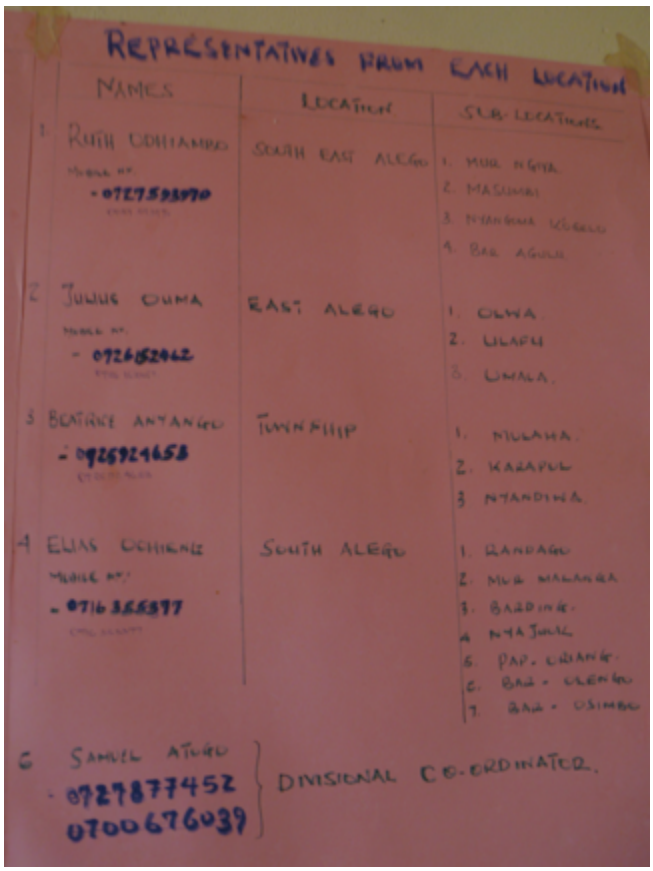
Co-operative working arrangements: from micro-actor to macro-actor

Under DEEP, the networks of entrepreneurs were seen to enhance their agency through other ways besides expanding supply chains. Many of the artisan manufacturers of cookstoves and briquettes were organised in co-operative working arrangements through which they were able to exchange information and provide mutual support. The products would still tend to be made by individuals and they would receive the income from their own products sold; where cookstove liners were grouped together, for example, each had a small mark indented on it to distinguish its particular maker. However, the group interconnectedness meant that they were able to increase their marketing abilities, raw material purchasing power and product price setting power, by reducing the risk of prospective customers being able to find cheaper products nearby. In essence the bonds made between the individuals in each group were able to turn micro-actors into more powerful macro-actors, to use Callon and Latour's (1981) terminology. It also allowed facilities, tools and techniques to be shared, although for the material equipment this did sometimes lead to bottlenecks where there was greater demand than availability.

Photo 46 shows the group structure of a cookstove-making cooperative in western Kenya that was being supported under DEEP. It involved a total of 15 family or village collectives organised into four sub-groups. Each sub-group had one representative that attended the monthly meetings at the rented group office, each having a different unpaid position such as Marketing Officer. Kariestop was registered as a community-based organisation in Kenya and each member had to pay a small monthly fee that went towards the office rent and other administrative costs. Customers were able to place orders at the office and these would be split across the group members according to production capacity and the sales income

also shared accordingly. As their financial officer told me: "Being brought together to work as a group empowers us, makes us able to fix prices better." Interestingly these entrepreneurs had been formed into a group by GIZ. However, they commented that GIZ had no mentoring facility and this is what they gained from their support under DEEP, specifically to support product quality improvements and marketing activities. Having seen how well their group structure was working, however, GVEP had started to form other DEEP entrepreneurs into similar groups.

Photo 46: Poster showing the group and sub-group structure of Kariestop cookstove makers in western Kenya



Enhancing agency: social brokering

The DEEP case study in particular seems to offer an interesting counter to arguments of micro-enterprise or distribution network development programmes having only negative impacts on the social ties of the poor, through various examples of GVEP's marketisation efforts adding to the connectivity and thus agency of their entrepreneurs. The facilitation of co-operative working groups by both GIZ and GVEP as described above is one example. Although Prahalad (2010) invokes the "extraordinary powers of connectivity among poor people" (Elyachar (2012) p.110), there still appears to be space for such development intermediaries to

act as ' brokers' of market relationships by facilitating new market linkages. In fact, based on Burt's (1993) theory where 'structural holes' within networks are used as an opportunity for brokerage, this puts the development intermediaries themselves in the 'entrepreneurial' category, although in these cases it is for 'development' rather than business gains.

This 'broker' service was often seen in cases where geographical mobility otherwise limited the likelihood of different actors coming into contact with each other. For example, GVEP staff introduced a cookstove liner trader from Mombasa to a group of women making liners in central Kenya. Because of limited clay availability around the coast, the trader had to buy liners from relatively far away, yet this limited the opportunities to find artisans via his social networks. Dennis (seen on the left in Photo 47) had managed to find a source in western Kenya via his wife's family, but the increasing transport costs of crossing the whole country were making his business unviable. At the same time, the women in the central region were struggling to carry their products to the local market, so a bulk order from Dennis immediately strengthened the prospects for their own business.

GVEP staff accompanied Dennis on his first visit to meet the women. Due to his dealings with full stove makers, he was able to instruct them in the quality required and techniques to achieve it. In conversation on the journey back from the visit Dennis stated: "I like GVEP because they are taking us slowly step by step, they are attached to so many people and organisations." He also said that the women had mentioned they bought vermiculite, a binder material added to the clay to strengthen it, from the coast and struggled to transport it. He was therefore able to expand his own business by delivering vermiculite when he took his otherwise empty lorry to collect the liners.

Photo 47: Women near Thika being trained by purchaser of cookstove liners

Various other examples were also observed where DEEP mentors used their own personal or work connections to obtain product orders for their entrepreneurs. Two entrepreneurs that had expanded into making briquette machines immediately gained access to all briquette makers supported by DEEP, giving instant demand for their products that would have taken much longer to build had they not had that connection with GVEP. Their businesses were further facilitated financially due to GVEP not having to pay import duty when delivering one of their briquette machines from, for example, Kenya to Tanzania via its offices.

Interestingly, one of those briquetting machine makers, called 'James' here, had started off as a DEEP entrepreneur but subsequently become a paid technology mentor under DEEP, employed by GVEP's technical project partner IT Power. He had started making the machines after GVEP staff had introduced him to the other machine maker who had given him the necessary training. Although in early DEEP promotional material James often appears as a 'poster boy' for the programme's success, when I met him he was a programme employee; his relationship with GVEP had thus changed significantly over time and brought clear benefits in terms of his personal situation. A similar example is cited by Crewe and Harrison (1998) who document how a stove maker in western Kenya, 'Alice' (pseudonym used), was trained by Intermediate Technology (now Practical Action) in 1987 but by the early 1990s became a technical assistant to the Project Officer, thus crossing the gap from 'beneficiary' to 'developer' (ibid., p.185).

Other ways in which GVEP and other organisations were seen to act as brokers include:

- GVEP running marketing days and helping DEEP entrepreneurs to attend trade fairs. Photo 48 shows cookstove makers from western Kenya exhibiting at a trade fair in Kampala, Uganda. Unfortunately in this particular case, the women were robbed of the money that they had earned when boarding the bus back to Kenya.
- GVEP linking DEEP entrepreneurs with institutions able to test their products, or organising the testing for them. This was both for certification against standards and in order for the entrepreneurs to know specifically how their products perform for marketing purposes.
- GVEP facilitating inter-entrepreneur linkages for other reasons, such as a cookstove maker working with briquette producers to package and brand their briquettes for sale to his cookstove buyers.
- SolarAid linking prospective buyers contacting their Mzuzu office with the local SunnyMoney entrepreneur or dealer in their area.

- Organisations such as Impact Carbon and Uganda Carbon Bureau providing access to carbon market devices that would otherwise be inaccessible to local stove manufacturers, as discussed in the previous chapter.

Photo 48: Keyo women from Kenya at a trade fair in Kampla, Uganda

A less immediately visible brokerage role is the advocacy work that development intermediaries are able to undertake on behalf of the market actors they support, who often have limited engagement with state institutions due to their informal economy positioning. For example, all three of the case study countries have (or had in the case of Kenya) reduced or zero import tariffs for solar products and this is also the case in many other African countries. These resulted, at least partially, from the advocacy and negotiation work of numerous development agencies, NGOs and networks thereof. It is something that individual solar entrepreneurs in each country are very unlikely to have had the power to influence.

Promoting indebtedness

Another and perhaps more easily critiqued brokerage role for development intermediaries is the provision of links with loan services. Elyachar (2005), Ismail (2006), Ly and Mason (2012) and others have found the notion of challenging poverty by promoting indebtedness problematic.

GVEP staff in fact found that already there was a tendency for entrepreneurs to assume that a loan or grant was the best or only solution for developing their business. Due to the aid legacy, they also felt that GVEP as an NGO was there to provide them with preferably a grant. GVEP staff had therefore often found themselves promoting alternatives to loans rather than promoting indebtedness. The operations director, for example, stated that "helping people to save is a better solution than immediately assuming loans are the best way forward." I also had an interesting conversation with another GVEP senior manager who equally questioned whether a debt-centric view of growth was really appropriate for small-scale informal businesses. Although this was common rhetoric in staff discussions, however, in some cases the importance of having access to finance still appeared to be instilled in entrepreneurs from the training stage. This was perhaps partly because it was one of the key features of DEEP that had helped 'sell' the programme to prospective entrepreneurs. At the end of the first day of a solar entrepreneur training course in Uganda, for example, the summary advice given to recruits for increasing their sales included "get financial help."

GVEP's loan guarantee system was an important aspect of the programme within a context of high and variable interest rates known to be a prevailing barrier to growth of enterprises. The Global Entrepreneurship Monitor carried out a study in Uganda in 2010 (Namatovu et al., 2010) and summarised that: "Inaccessibility to funding stems from the reluctance of financial institutions to lend money at affordable rates […] This may be because the credit history system is still in its infancy and many potential borrowers lack the requisite collateral to access money from financial institutions. While government grants, micro credit and Savings & Credit organizations (SACCOs) are attempting to fill this void, the impact is at best minimal and the cost of borrowing is still high." (ibid., p.46)

The reduction of risk for the financial providers by GVEP agreeing to underwrite the loan meant that they could provide fixed and lower interest rates compared to those offered to non-DEEP customers. The financial officer in Uganda explained the outcome of this:

> The interest rate with FINCA [for DEEP entrepreneurs] is 18% per annum, or 1.5% per month. It's a fixed interest rate, at a time when many people are having issues. FINCA have just raised theirs for non-GVEP customers, from about 28% to 30%, sometimes 35% for group loans, but it depends on the product. The interest rate for SACCO loans under GVEP is also 18%; what they charge their other customers varies though – some are at 30%.

Those who did secure a loan via GVEP's guarantee system were often seen to put it to good use, as shown in Box 6 which summarises some of the entrepreneurs' own statements about loans they had received.

Box 6: Examples of DEEP entrepreneurs using GVEP loans effectively

Mwangaza cookstove liners (Dede family, Kenya) – Had just been approved for a loan from Kiva and were going to use the money to build a dedicated store for drying he liners and for mending the kiln roof which was leaking.

Farouk – Used it to buy a van to reduce transport costs of picking up materials and delivering his cookstoves. This enabled him to reach a wider market and look further afield for cheap materials.

Herbert Bogezi – Loan from FINCA, obtained with DEEP guarantee at monthly rate of 1.5% interest ("it would've been 2.5% otherwise"). Used for buying moulding set for clay liners so can expand into making liners. Was offered 8 million loan but only accepted 1 million. Moulds cost 100,000 for large set and 70,000 for smaller. Rest being used to build large kiln for firing the liners.

Edward and Nora Mukasa – Bought manual briquette machine as too expensive to buy without a loan and were previously making briquettes by hand. Need carbonising drum but don't want to get another loan, might be able to use savings. Very worried about theft so keep machine safe (it was wrapped up and tucked away in their kitchen). Difficult to repay loan because wet weather making it difficult to keep briquettes dry, but bank won't listen to excuses about the weather. Would get a fine if they default, not sure how much as hasn't happened yet. But production should be huge next month when rains stopped.

Mrs Margaret Kisakye – Got a manual machine to make briquettes in 2011, two years after starting her briquette business, using a FINCA loan. Used to be a nurse but now only makes briquettes as better financially. It's been fine to pay off the loan and she would be happy to get another in the future. She needs more than one machine in order to produce more briquettes. There's plenty of market for it, no limit to demand.

For DEEP entrepreneurs to receive a loan they had to be nominated by their mentor. If approved by the DEEP financial officer for the country an application would be put forward to a relevant financial institution. The conditions of the relationship between GVEP and each financial institution was formalised through a Memorandum of Understanding (MOU) stipulating that the institution undertake all the checks normally carried out for a loan (i.e., the normal due diligence process); if this was breached GVEP would be exempt from the loan guarantee. The intention

was to make sure that only those viable for a loan would be taken on, so that a strong entrepreneur-mentor relationship would not be enough for an entrepreneur to secure a loan. This arrangement did seem to cause some confusion for the entrepreneurs, however, who were asked for some form of collateral against their loan despite GVEP claiming to be underwriting it. For one set of applicants in Uganda it was proposed that the land ownership certificates for their homes would be used as collateral and therefore they should provide a copy to the bank. They immediately refused to comply and their loan application had to be withdrawn. It transpired that despite attempts to explain the arrangements, the entrepreneurs had seen the prospective loans as grants with no risk to themselves if not repaid.

This was not the intention of the loan system. Instead, it was hoped that by being persuaded to take on energy entrepreneurs as clients and experiencing successful relationships with them, the financial institutions would gain adequate information and confidence to no longer mark other similar actors as high risk. GVEP's financial managers noted some examples of this: one SACCO was seen to develop and offer more widely a specific energy financial product. "They lend energy products 'in kind', as well as in cash. The 'in kind' method prevents a diversion of funds and ensures the entrepreneur is spending it on their energy business, for example, briquette making machines, or a solar panel. It can be for business or domestic use, it doesn't have to be for commercial activity."

As well as the more positive examples given in Box 6, GVEP staff experienced some difficulties with entrepreneurs who were given loans. Early in 2012 in the Uganda office, for example, the financial officer returned frustrated from a meeting. It transpired that a group of entrepreneurs were no longer paying their loans back because they had not in fact invested all (or, in some cases, any) of the money provided in their energy businesses and were therefore not making enough income from sales to cover the loan repayments. Some had bought materials and machines but had not started using them yet. Others had only bought a limited amount of materials or stock that had not been enough to sell adequate numbers of products for loan repayment. The outcome of the meeting was that they were asked to sign a commitment to work harder in order to make the loan repayments by a new deadline date, but since it was not a financial institution and had not taken any collateral against the loans, the only power GVEP ultimately had to force loan repayments was to threaten to drop the entrepreneurs from DEEP. This would obviously write off the loan debts for good so was only a last resort, and it is unknown if this had to be done in any cases by the end of the programme.

Box 7 provides some more mixed statements from DEEP mentors about the attitudes of entrepreneurs to loans. It shows that each person would react differently, and their varying attitudes and circumstances would be strong determinants of whether the loan system was deemed to be successful for each individual.

Box 7: Statements by mentors about DEEP entrepreneurs attitudes to loans

"Mr Herbert was offered a loan of 8 million Ugandan shillings, but he accepted only 1 million because he wanted to be serious with that first and make sure he could pay it back. Then he will take more next time and build it up steadily. But others are not serious, they're only interested in the money. We can't be sure that if they get a loan they'll use it for that instead of something else. They don't think about that it needs to be paid back."

"We had some problems where entrepreneurs used the loan to start poultry farming, instead of for their energy business. The environment and finance can affect them too. They don't have any money for when times are difficult."

"Many were expecting a grant, so those weren't so interested, they just sat there waiting. But the ones who got the knowledge and went and applied it, they've done well, and then they got a loan because they demonstrated their initiative and that they can pay it back."

Although providing access to loans was the main means of financial support under DEEP, some people suggested alternative models. A DEEP entrepreneur who was looking to buy a lorry suggested that instead of helping him get a loan: "GVEP should even buy a truck and sell it over time". This system would be akin to a 'hire-purchase' scheme and is similar to the 'in kind' loan developed by the SACCO in the example above. Another suggestion was put forward by one of the GVEP financial officers. She had previously provided training on rotating credit co-operatives and wondered why this was not being promoted by GVEP, especially since many entrepreneurs were already organised into groups that would have been conducive to such a system. An example is a Village Savings and Loans Association (VSLA) that requires a locked box with three separate padlocks (Photo 49). Everyone in the group puts equal monthly payments into the box and loans can then be taken on a rotating basis. The box can only be opened when all three key holders are present together at group meetings. A similar concept is 'table banking', which has the same group saving and loans structure but is less prescriptive about the method of storing funds. Overall, however, it seemed that formalised loans and debt had become more legitimate; that becoming part of the formal economy meant

using formal channels for obtaining capital rather than the informal ones that are often relied on outside of development programmes.

Photo 49: VSLA tools: member passbook (left); savings box with three locks (middle and right) (Gibbs, 2009)

While SolarAid does not actively facilitate formal loans, it has in the past provided solar entrepreneurs with products on credit and in some cases they were able to amass huge debts. In the end, these had to be written off by SolarAid because of the significant administrative costs (if not impossibility) of chasing repayment. Those entrepreneurs may not have suffered adversely, therefore, but it did contribute to SolarAid's decision to primarily focus on established dealers from thereon. With the remaining entrepreneurs SolarAid is now careful to ensure that previous debts are repaid before new stock can be ordered, similar to the method used by Avon in South Africa (Scott and Dolan, 2009). SolarAid also restrict supply of stock on credit (i.e. without full up-front payment) to people seen as trusted, either through a long established relationship with them or due to them being someone of particular responsibility within a community. As part of their schools campaign, for example, they leave unsold stock with headmasters or the district Primary Education Advisor to act as a local sales point prior to longer-term dealers being established in the area.

7.7 Summary of findings

This chapter has addressed the third research question:

> What processes render people into 'local entrepreneurs' and thus economic actors?

The key points made in response to this question are summarised below.

Who becomes marketised?

From the outset, the incorporation of local actors into these specific marketisation activities results from the existing connections of the development intermediaries and their partners, along with various 'chance' encounters. This leads to distribution

networks being shaped in particular geographical clusters. Already networks have played an important part, and once potential entrepreneurs are found they continue to spread the word amongst their own networks.

The next stage involves screening to decide which applicants will be selected for support. For both GVEP and SolarAid this process had previously been fairly limited and informal, with motivation and feasibility of participation often being sufficient. Over time, however, both organisations experienced some issues with this approach, with various DEEP entrepreneurs 'dropping out' of the programme and SunnyMoney entrepreneurs not repaying their debts for stock supplied on credit. On the other hand, many 'successes' were also seen in both case studies, with no obvious determining individual factors for success but a complex suite of interlinking conditions giving them the necessary agency and willingness to apply it. Even those that would not be deemed 'successful' according to the organisations' monitoring and evaluation (M&E) departments may have gained additional market tools to perform roles in other market systems.

Choosing the particular actors to engage with will never be a fully systematic process, and equally there is no 'one size fits all' approach to shaping market actors. Furthermore, these engagements can lead to increasing strength of relationship between 'developers', now marketisation actors, and those previously referred to as 'beneficiaries', leading to blurred or crossed boundaries in various cases. Even the apparent 'developers' are mostly local actors too, subject to similar recruitment processes to those on the other side of the programme.

Although this analysis is based on a very limited sample size, it does appear that those at the 'front line' of the initiatives (i.e. directly supported by development intermediaries to perform market roles) are increasingly not at the 'bottom of the pyramid' (BOP) but somewhere just above it, with evidence of existing financial, material, social or cognitive resources (or a combination of these) being a factor in their recruitment. This can be defended through suggestions of a 'trickle-down' effect of 'sub-dealer' roles, but the next chapter provides further discussion of how potential 'development benefits' are weighed up against each other.

How are they marketised?

The local actors are given various forms of training and other support to help them 'perform' a role in the supply chain. It is argued that even a simple shift in the language used, from development 'beneficiaries' to 'entrepreneurs', is the start of this marketisation process. The labelling and treatment of people as entrepreneurs

has a performative role, with entrepreneurship as a 'discursive device' being seen as an important first step of the marketisation process that both GVEP and SolarAid are aiming to undertake. DEEP's training material in particular presents entrepreneurship as something that can be acted out with the right attitude and through obtaining the necessary skills, conveying it as accessible to all.

For DEEP, it appears that the relationships developed between entrepreneurs and their mentors are key to the success of the programme. Careful recruitment of the mentors is as important or even more so than selecting the trainees themselves. The strength of these relationships derives from frequent visits, telephone communications and an ability to converse in the local language. It results in the mentors motivating and instilling confidence in their allocated entrepreneurs. SolarAid does not have a mentor system or anything similar to help establish and maintain a close relationship between sales people and the organisation; this could perhaps have been why some of their entrepreneurs ended up with significant unpaid debts.

The DEEP entrepreneurs were found to have become conversant in the language and cognitive tools of business. This is not to say, however, that they are passive actors subjectified by the marketisation processes of the development intermediaries, blank sheets that receive, absorb and act. Instead, each builds on their own existing skills, networks, ideas, tools and facilities to make their market performance unique. Equally numerous limitations to their opportunities apply: calculating a price based on profit margin is very difficult without records of material purchases and sales, or paper, pen and a calculator to help computation. Despite these restrictions their 'conversion' into energy product market actors can be argued to start with their adoption of the language and actions of business people. Those that do not complete this process and maintain their energy business as a part-time sideline rarely manage to become significant actors in the market. Those that do complete it then become marketisation actors themselves through carrying out their intended role. This might be, for example, using marketing techniques to persuade consumers to place themselves within the framing of products outlined in the previous chapter.

A closer look at the socio-technical assemblage that creates a market actor shows great variation in the material tools and facilities involved. As businesses are drawn into the formal economy, they climb a hierarchy of equipment and facilities: from hand making briquettes to using electric-powered machines and the related materials to make it function, and from selling solar lanterns from a bag to having a permanent shop. Innovation and production of tools provides a further business

opportunity for 'entrepreneurial' entrepreneurs. Without techniques, however, tools are inert objects. Again, developing and refining techniques provides a niche for entrepreneurs to provide training services. Mobile phones have also been seen to be a huge contributor to market agency, not just for facilitating communication but also for services such as money transfer. Inevitably there will also be numerous new ways in which these tools act as enablers of market activity over time.

Is marketisation of the poor and their networks problematic?

Lastly, this chapter has addressed the role of networks for these market actors and tried to respond to some of the related critiques posited in academic literature. The networks of the entrepreneurs are inevitably drawn into the marketisation process for sales, supplies, production capacity, information, general support and much more. This does not appear to be through any forced requirement, however, and various activities aim to go beyond the boundaries of existing connections, possibly offering associated benefits to an entrepreneur's non-economic endeavours at the same time.

Trust is a key requirement for market exchanges to take place, and where this already exists through social ties it may enhance the possibility for transaction – but equally make a relationship more vulnerable to a breach of trust. Where development intermediaries are promoting specific products, inadvertent jeopardising of trust-based relationships could be argued as problematic. This is particularly the case if the devices established to address faults (discussed in the previous chapter) are not accessible so that no means of redress are available. The limited willingness of entrepreneurs to engage in credit based exchanges with customers based on verbal agreements suggests that some have already moved away from the types of transactions that characterise the informal economy, yet they still lack access to formalised alternatives.

Further positive aspects of networks on marketisation processes are made clear by a focus on co-operative working arrangements that can be seen to lift actors from micro to macro and empower them accordingly. Where these arrangements have been deliberately created by development intermediaries, they are undoubtedly an example of how establishing 'market' networks can increase agency more generally, not just as 'market' actors. Further examples of the case studies and other organisations filling 'structural holes' between people or groups of people show that there can be a useful role for enhancing agency via social 'brokering'.

The final critique challenged is one of promoting indebtedness. Again, the desire to move the entrepreneurs towards formalised arrangements seems to have led to a focus on promoting engagement with financial institutions under DEEP rather than promoting more localised versions of savings and loan mechanisms. It is not clear if this can be categorised as positive or negative: many entrepreneurs had been seen to benefit from formal loans, at least from the data collected, while others had amassed debts or appeared to be confused at the conditions. Perhaps more flexibility to allow organically developed, local solutions is an answer, similar to finding product repair strategies that are better suited to the contexts than formal warranties. The engagement of GVEP with SACCOs and their related extension of services may be a partial step towards this.

Overall, I would argue that the development intermediaries focused on here are not engendering economic subjectivities alone or enacting a marketisation process by themselves from a standing start. Instead they shape the actors engaged with into the roles needed for the market to be performed and to grow. The existing networks, tools and techniques of those 'entrepreneurs' necessarily become involved too, and this suggests caution where those are vulnerable to misuse, but the process can equally augment the social and technical resources of individuals involved. In general it is possible that the 'subjectification' of market actors is more positive than engendering 'charity-dependent' subjects.

8 The development intermediaries: successful marketisation entities?

> A multiplicity and diversity of actors compete to participate in defining goods and valuing them. (Çalışkan and Callon (2010) p.8)

In chapter 6 the products were put at the centre of the marketisation process, and in chapter 7 the process of rendering local actors 'economic' to become entrepreneurs that actively participate as socio-technical assemblages in producing, valuing, pricing and exchanging those products was addressed. In this chapter, the focus shifts to the development intermediaries. These are the key actors that were both central to the research in a practical sense (actually being the field sites) and central to the marketisation processes studied, through their formative roles in developing and pacifying sustainable energy products and economising local entrepreneurs to create or expand distribution chains.

As described in Chapter 2, market-based approaches have become increasingly prevalent within the international development sector and particularly amongst NGOs, with origins from 'enterprise development' activities that started to emerge in the 1970s and links to the promotion of 'sustainable livelihoods' in the 1990s. Improved efficiency cookstoves, in particular, were an early subject of local market-building programmes, with varying degrees of success. More recently Prahalad (2010), amongst others, promoted the involvement of business more widely in meeting the needs of the 'bottom of the pyramid' (BOP). The quasi-development for-profit notion of 'social enterprise' now features prominently in activities to develop and distribute products to the BOP. In these particular case studies GVEP is a more traditional NGO, reliant on donor funding for specific programmes such as DEEP, while SolarAid started as an NGO but has recently established a social enterprise, SunnyMoney.

Like the local entrepreneurs, and like markets as a whole, these development intermediaries can be conceptualised using Çalışkan and Callon's (2010) terminology as market socio-technical assemblages. This term describes how their capacity as marketisation actors [22] comes from their varied and dynamic configurations of human and technical tools, practices and networks. This chapter aims to explore some of the various components in more detail and address the fourth research question:

[22] This term is use to describe actors that come together to create a market around a specific product; they are the "forces that set markets in motion" (Çalışkan and Callon (2010), p.8).

What factors affect the agency and actions of the development intermediaries as marketisation actors?

The discussion highlights that in addition to their involvement in clean energy product markets, these organisations are also operating in another market: for the delivery of development-related benefits. The marketisation lens can be extended to consider how this other product, in its less tangible form, is equally subject to processes of qualification and valuation that are often 'black-boxed'. It is illustrated that different organisations will prioritise different types of development benefits, but inevitably there is competition between development actors – despite them often being treated as exterior to market processes due to their socially conscious objectives. Taking account of the human component of socio-technical assemblages, the actions of an organisation inevitably arise from the agency and actions of the individuals within. Although attachment to donors will provide constraints, the power struggles here are less marked than perhaps expected, with the skills and relationships of the local employees at the 'front line' of the intermediaries often being seen to determine specific outcomes.

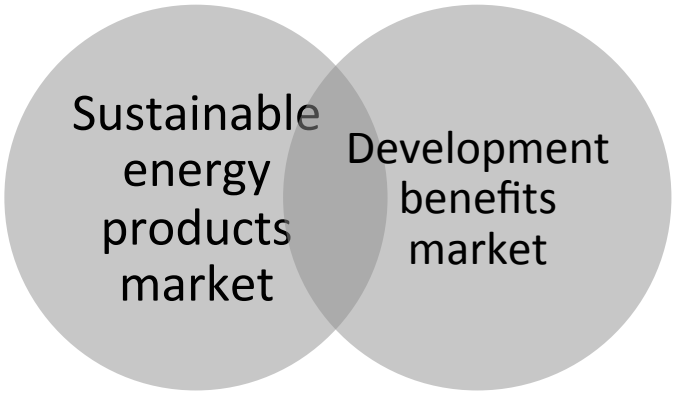
More broadly, it is argued that a shift towards markets reduces reliance on the development discourses and practices oft-critiqued by post-development actors, for example tackling 'developer'-'beneficiary' dualisms and reinforcement of 'developing' country perceptions. However, this can be replaced by criticism of the power asymmetries between international macro actors able to access black-boxed market devices that are unavailable or inaccessible for local market actors. Non-profit organisations have the potential to broach some of these asymmetries through 'brokerage' and, it is posited, there remains a role for the state.

Examining the diversity of actors competing to deliver humanitarian goods to BOP consumers overall shows that while attachment to development-related donors and investors imposes restrictions, it can also provide some safeguards in terms of reporting requirements, something that seems particularly necessary when targeting a vulnerable consumer group. For-profit approaches have an in-built feedback mechanism: whether consumers choose to participate in market exchanges or not. However, this leaves new BOP entrepreneurs most exposed if approaches fail. Overall, there have been some successes in marketisation but tensions between actors exist where priorities or approaches differ and have the potential to undermine each other.

8.1 Qualifying and quantifying development benefits

Development intermediaries that are trying to facilitate markets for 'humanitarian goods' are also operating in another market for a less tangible product: the provision of development-related benefits (Figure 47). Although the two case study organisations, GVEP International and SolarAid, are using market-based approaches and SolarAid has even started a registered business (SunnyMoney), they have still emerged from the 'development' concept and continue to rely, at least partly, on grants, donations, prizes and other forms of donor funding. The delivery of 'development benefits' is the reason for donors to provide funding, and they need to be reassured that the service they are effectively paying for is being delivered as promised in programme design documents, so that they in turn can pass this information on in turn to their own funders where applicable (e.g. taxpayers in the case of national development agencies). Furthermore, to ensure that the inflow of development funding continues in future, the development intermediaries must continue to market themselves by advertising their ability to successfully deliver development benefits.

Figure 47: Development intermediaries using market-based approaches are involved in the development benefits market(s) more generally



As per Caliksan and Callon's (2010) research programme for markets, a first step then is to examine how development benefits are pacified or objectified by the entities that engage with them in order to make them into goods for, if not physical exchange, at least virtual exchange in the form of reporting back to the donors who provided the financial means for their delivery in the first place.

Different types of development-related benefits have varied ways of being measured and levels to which measurement systems have been created and adopted. Projects that deliver climate-related benefits through a reduction in greenhouse

gases, for example, now have an established method to calculate tons of CO_2 equivalent reduced (as discussed in Section 7). This is commonly known as 'carbon accounting' and although it offers plenty of complexity and controversy, it at least provides a system that can be applied across diverse activities to make their impacts partially more visible and facilitate valuation and comparisons on some methodological basis. It can be more difficult to make other development-related benefits 'visible', but it is still necessary to undertake some degree of qualification of possible benefits for donor reporting and marketing purposes more broadly. For this reason, monitoring and evaluation (M&E) activities are a significant focus for most development intermediaries and there is generally a dedicated individual or team tasked with undertaking it full-time. Their responsibility is to track progress of activities and the associated benefits provided, generally against a set of targets that have been established at the design stage of a programme. The M&E data can then be presented to donors and more widely as a suite of facts about the achievement (or otherwise) of the programme's aims.

As Latour (1987) reminds us, facts are often presented as "devoid of any trace of ownership, construction, time and place" (p.23). Yet contrary to the 'black-box' attitude to the production of facts that results in them being presented as cold, stable statements, facts always have a history that involves a multitude of social and technical processes. This has already been highlighted in the discussion of the scientific qualification of the products in Chapter 6. Here the facts that are created around development-related benefits are put under the spotlight.

The production of the data that development organisations ultimately use to report on and market their activities is not dissimilar to the process that businesses selling products or services also undertake, except that there is no direct monetary exchange for each unit of development 'service' provided. With no way to perform a 'stock-take' or cross-reference tangible sales figures with financial records, the facts produced by a development intermediary are predominantly reliant on trust. Sometimes an external evaluator will be requested so an independent third-party will attempt to delve into the black box to provide verification or otherwise of the legitimacy of the information provided. This did not seem to be the case for GVEP International's DEEP, but SolarAid did commission an external evaluation in Malawi shortly after my fieldwork finished, in response to reporting requirements set by the donor for a specific programme component.

To give an example of the way in which development benefits are made visible, the CO_2 reductions figure given by the social enterprise d.light (discussed previously in

Section 6.4) is presented on their website as part of a group of statements about their overall 'social impact'. The full list of facts provided is shown in Figure 48 below.

Figure 48: d.light statements on social impacts of their business (d.light design, 2013)

As of May 31, 2013, d.light has achieved the following impact:

17,508,631 lives empowered

4,377,158 school-aged children reached with solar lighting

$412,854,521 saved in energy-related expenses

4,561,408,106 productive hours created for working and studying

1,047,505 tons of CO_2 offset

18,844,636 kWh generated from renewable energy source

Our social impact calculations are based on unit sales volumes to the developing world only, using conservative assumptions and the highest-quality available external research, such as from the United Nations and the International Finance Corporation. Specific inputs may evolve over time as more definitive date becomes available, in our efforts to improve the accuracy of these figures.

Given the caveat provided below the figures, it is particularly surprising that such precise totals are presented. The number of productive hours is given to ten significant figures, for example, even though defining and measuring a 'productive hour for working and studying' can easily be subject to a wide range of approaches and assumptions that would offer diverse results. It is equally a difficult process to quantify such subjective impacts as 'empowerment of lives', yet d.light suggest that it can be calculated to the level of each individual person 'empowered'. The number is in fact either a simple multiplication of the number of 'school-aged children reached with solar lighting', or the number of school-aged children reached has been derived from the overall number of people 'empowered'. It is unclear, however, what processes lead to these relationships between the data. My only direct engagement with d.light was an interview with a regional director which unfortunately provided insufficient time or access to delve deeper into the black box of their development data production. However, the ethnographic research with GVEP International and SolarAid did provide such opportunities.

GVEP International

My role to support the M&E officer at GVEP International allowed some exploration into how development benefit indicators are produced. In the same way that tangible products have standardisation and quality control frameworks developed by market actors over time, guidance and quality systems have also been created by development stakeholders to help strengthen the validity and credibility of M&E, often with specific guidance for different sectors. The Donor Committee for Enterprise Development (2012), for example, offers a standardised approach for private sector development programmes.

Despite such guidance materials, during the research it became evident that M&E is still an extremely difficult task. The recently appointed M&E officer at GVEP International was quick to point out the issues during my first day of work at their regional headquarters in Nairobi. The first obstacle was that the programme had grown quickly and there had not been time to collect much baseline data before it was underway. There was therefore no concrete baseline to measure changes since the start of the programme against. Even where data had been collected from new DEEP entrepreneurs about the size of their business prior to any engagement with DEEP, sometimes these figures were later found to have been either inflated or under-reported. Which direction the figures were changed in depended on the entrepreneur's experience or perception of NGOs and thus whether they hoped GVEP would be more inclined to support a thriving or struggling business. As Jerven (2013) highlights through detailed accounts of collecting economic data in sub-Saharan Africa[23], people inevitably perceive incentives and counter-incentives when asked for data. Even without this influence, most small, informal Kenyan and Ugandan businesses have limited record keeping. GVEP provides training on this but it meant that any baseline data was generally estimated, if provided at all.

Ongoing data collection was similarly problematic due to the long chain of actors it occurred through: from DEEP entrepreneurs to DEEP mentors, to the DEEP country office and finally to the regional headquarters in Nairobi where the M&E team were sat (Figure 49). Depending on the technology available, the data could be passed verbally, hand-written on paper, typed on paper, or emailed in the body of an email or in an attached spreadsheet. The long chain of people and technologies made gaps and inconsistencies in the data both frequent and hard to investigate. Already the

[23] For example, the population census in Nigeria in 1952 during colonial administration was rightly assumed to be for calculating tax payments, whereas in 1962, post-independence, it was expected to feed into investment decisions and voting rights. Therefore the 1952 census figures resulted in a significant 'downward bias' for total population count, while an unexpectedly large population was counted in 1962 by comparison. (Jerven, 2013)

amount of data collection was seen by the entrepreneurs to be excessive, with one having remarked to GVEP staff that they thought GVEP was a data collection agency, not an NGO. Many entrepreneurs were also understandably wary of giving out private financial information about their businesses.

Figure 49: Illustration of the multiple actors that DEEP monitoring data travels via

Once again, all stages of data capture are unavoidably carried out with the expectations or requirements of the prospective recipients in mind, whether those expectations are imagined or real. Entrepreneurs themselves might exaggerate sales figures slightly in order to appear to be doing well to please their mentors and meet their monthly targets, or equally diminish them in the hope of being offered additional support. Evidence of this was seen when one enterprise being supported by two separate NGOs (GVEP International and another) provided a different set of monthly data to each, seemingly deliberately and adjusted according to the perceived policies of each. At the next level up, the DEEP mentors again would be aware that their performance evaluations are at least partly based on the evidence of improvements in the businesses that they are responsible for. Equally, as for any development intermediary, all of GVEP's staff will be aware that the continuation of the programme as a whole know is highly dependent on it being reported positively to the donors. The purpose here is not to suggest that the data was ever intentionally manipulated, and indeed no observations suggested it might be. Rather, the aim is to illustrate data cannot be entirely separated from the context in which it is generated.

On the technical side, even apparently simple information was sometimes hard to collect, such as the total weight of briquettes made and sold in a month: as discussed in Chapter 6, many briquette makers do not have any means of weighing their products. (A rare example is shown in Photo 50). Number of employees also seems a simple figure to record, but some entrepreneurs saw themselves as an employee of their business while others did not, and many called upon various family members to help on a casual basis occasionally.

Photo 50: Peter Ouko Odhiambo, one of few DEEP briquette makers who had a weighing device

Photo 51: A DEEP mentor (right) helping an illiterate DEEP cookstove entrepreneur to fill in her record book

During my fieldwork, the DEEP M&E systems were constantly being revised to try and address these issues. All of the entrepreneurs were provided with special DEEP

record books that had carbon copy pages for the mentors to collect and extensive instructions such as "number of employees (excluding yourself)" split into "full time" and "part time / casual labour". These measures certainly helped, but new difficulties will always emerge such as low literacy and numeracy levels (Photo 51) making it hard for some entrepreneurs to fill in increasingly complex looking templates. It was also suggested that mentors be given smart phones with a special DEEP M&E application for them to enter data when visiting entrepreneurs, but the costs were found to be prohibitive. Inevitably this system would again solve some difficulties but bring new complexities.

Once the data was finally with the M&E team, it was aggregated as far as possible and various assumptions were applied for calculating overall benefits, to be reported to the donors in quarterly reports. Household size, for example, was estimated at five people when the programme started, based on census data. The number of energy products sold was thus multiplied by five in order to calculate the total 'beneficiaries' of those products, assuming that everyone in a household would obtain at least some benefit from a solar lamp, for example. However, later into the programme too many people seemed to have benefited too quickly using this assumption and the number of beneficiaries was in danger of exceeding the programme's target too early. Household size was therefore reduced to four, a more conservative estimate. Between one calculation and the next, suddenly thousands less people had apparently benefited from the programme. Statistical data can be used to defend an assumed household size of either 4 or 5, depending on the particular method used, so neither is invalid yet the decision has a remarkable impact on the overall picture presented.

DEEP ended in early 2013 and GVEP summarises the benefits it delivered on its website, shown in Figure 50. It highlights that the target of 1.8 million beneficiaries was exceeded, with over four million ultimately being reached. Additionally, it states that DEEP created around 3,000 jobs in the region. Having delved into the black box of how these facts were produced turns them from cold, stable certainties to the hot, unstable estimates that they are. Even simply knowing that the starting baseline of product sales and employees prior to DEEP was hard to elucidate, let alone a likely growth rate of these businesses if they had not had DEEP support, makes it hard to accept that factors such as job creation were entirely due to DEEP alone and would not, at least partly, have occurred in its absence. All of the data collection steps I observed at GVEP were carried out transparently and conscientiously with continuous improvement measures being implemented, and it

would be hard to fault any step of the process. Yet even with this obvious level of integrity, the data clearly has an evolution that is intrinsically linked to the social and technical processes of its creation.

Figure 50: DEEP summary on GVEP International's website (GVEP International, 2013b)

DEEP - Developing Energy Enterprises Project - Ended in February 2013

Through the DEEP programme, GVEP developed a sustainable and widespread industry of micro and small energy enterprises. Spanning five years, the Developing Energy Enterprises Project (DEEP) started in March 2008 and ended in February 2013. This €4 million initiative was supported by the European Union and the Dutch Ministry of Foreign Affairs (DGIS). It aimed to deliver energy access to 1.8 million people in Kenya, Tanzania and Uganda. This target was substantially exceeded as it reached over four million beneficiaries by the end of the programme.

Over 900 micro and small energy enterprises (MSEEs) were supported by DEEP. These businesses were involved in the manufacture and/or supply of clean cookstoves, solar PV products and services, clean fuel briquettes and biogas systems. GVEP provided them with mentoring, training and support services covering: product quality and technical issues, business and sales skills, access to finance and access to business networks. These entrepreneurs work at the bottom of the pyramid (BoP) in rural and periurban areas. The products and services they offer have contributed to provide an improved access to clean energy solutions for low-income customers in these communities. This programme created approximately 3,000 jobs in the region.

Like shareholders of a company, the power of donors is clearly never forgotten by development intermediaries. At the donor reporting level in GVEP, there was inevitably understanding of the repercussions of not meeting targets agreed with the donors: "Not financial repercussions, presuming you're not found to have stolen money from them. But the EU marks a project based on its success so we want to be in the excellent category, so they'll come to GVEP again next time. It's all about reputation. If it's unsuccessful it might jeopardise getting aid in the future." Regardless of the difficulty in collecting it or ensuring its accuracy, the monitoring data became an essential tool for keeping track of progress of the programme towards its objectives. If any obstacles came to light via this data, the management team were quick to respond to them. Difficulties with DEEP were always addressed in the donor reports with a corresponding explanation about how they were already being tackled. Actions taken even included a fundamental restructuring that had occurred just before I started my fieldwork. Its justification was described in a 2010 quarterly donor report:

> As project monitoring showed that the outcomes were not being achieved as anticipated […] a thorough re-organisation and restructuring of the methodology and project operations was the focus of activities in Quarter 8. During this quarter, the project was restructured both in operational methodologies, as well as the

> revision and update of tools being used and the development of new ones where necessary. (GVEP International (2010a) p.4)

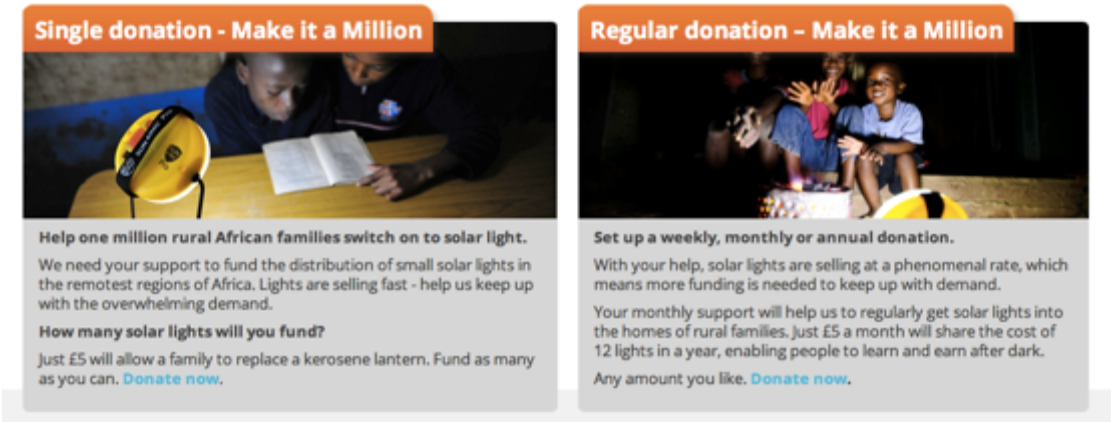
Ultimately with its successful restructuring and positive results (indeed over-achievement against targets) to report, GVEP was able to sufficiently demonstrate to the donors that the development services they had paid for had been delivered. The success of DEEP was also marketed effectively, to the extent that CARE2 (Capital Access for Renewable Energy Enterprises) has since been established to succeed it.

SolarAid

By creating a social enterprise, SolarAid have reduced their participation in the development benefits market, thus reducing their reliance on the production of facts to feed back to donors in order to justify continued support. However, as well as collecting sales data for financial reporting, they do still continue to make an effort to collect data related to social benefits more broadly, such as improvement in exam results in schools where solar lights have been provided. While I was in Malawi, I helped gather baseline data on exam results for schoolchildren who had not yet had an opportunity to use solar lighting, with the intention of monitoring their progress over time once solar lights were made available. The social enterprise status of SunnyMoney and associated search for 'social' investors, as well as SolarAid's continued legal structure as a charity, means that continued monitoring and marketing of impacts beyond simple product sales is still required.

Where this results is an interesting quantification is in the link made between donations to the charity and the availability of solar lighting systems that they result in. Given SunnyMoney's role as an importer and distributor of pico-solar products it is fairly straightforward for them to monitor product sales directly related to its work. However, a harder task is analysing how charitable donations received by SolarAid lead to product sales due to the marketisation activities undertaken. How much donor money does it currently take to make solar lanterns available to a family? The data used for making such an estimation has again been through various social and technical processes of collection, aggregation, assumptions applied and calculations. It is finally pacified and presented succinctly in a concise statement to possible donors on the SolarAid website: that a £5 charitable donation makes a solar lantern available to one household (Figure 51).

Figure 51: SolarAid website extract showing advertised link between donations and product availability (SolarAid, 2013b)



Again, the intention is not to suggest any malpractice on the part of SolarAid. Though it could perhaps be better worded, they are clear elsewhere on the website that the solar products are sold, not given out for free, so individuals who may become donors should theoretically understand that they are not actually buying a solar lantern on behalf of a family. SolarAid staff explained the £5 figure as follows:

> The £5 is how much it costs us to get each light into the hands of a customer. So it's the TOTAL SunnyMoney and SolarAid organisational costs minus any revenue from light sales divided by the number of products sold. So you can see it'll go down in time, will fluctuate due to exchange rates and success, and will also differ between countries, but it gives us an idea of what we 'subsidise' to build the market.

As this statement indicates, the money contributes to the operational costs of making the solar products available. The retail prices of the lanterns are not yet set high enough to reflect all of the operational costs of establishing the SunnyMoney supply chain to reach remote rural areas. The intention is that once the market infrastructure is established it will be financially self-sustainable in the longer-term, but currently charitable donations cover the shortfall. The prospective purchaser (funder) of the 'development benefit' is seen to require a more specific valuation of what their money will buy, however. By setting a price of one lantern being made available to one family at £5, a much more defined and marketable product is immediately created. As a SolarAid staff member explained "people making donations still love to think that they are giving things away rather than funding core costs or operational processes; it's a real challenge."

Positive development benefits

Of course, a more fundamental aspect of M&E systems are that they are set up specifically to identify 'benefits' to 'beneficiaries', not 'adverse impacts' on 'victims' or any other type of discourse that might immediately set up a different picture. As the GVEP M&E officer highlighted "they're always geared up for monitoring benefits, but we often forget to ask about potential negative impacts." He gave the potential but unsubstantiated example of new solar technicians experiencing an increased number of electrocutions. Some illustrations of the people that might be adversely affected by marketisation activities through displacement of the technologies they are engaged with have been provided in Chapter 6.

No company, for profit or otherwise, would advertise their activities to promote solar lantern sales by estimating the number of kerosene sellers they have put out of business, for example, as this does not help reinforce them as humanitarian goods and they cannot sell development 'dis-services'. Again this is perhaps something that development organisations could be criticised for. Yet just like mainstream businesses[24], they are competing in markets and, provided that the direct impacts of their activities are monitored and made transparent, it is perhaps unrealistic to expect the boundaries of that monitoring to extend to all impacts on all inter-linked markets. Indeed, the goal of eradicating the kerosene lantern has the removal of kerosene selling as a livelihood clearly embedded within it.

Efforts to identify adverse impacts were still visible, however. SolarAid's Director of Research and Impact, for example, stated in a blog post: "Some time ago, we committed to exploring whether there were any negative consequences of the School Campaign so that we could make sure we could address them if there were. So, we spoke to head-teachers to understand how the campaign was run at their school and we interviewed school committee/parent-teacher association (PTA) members." (Harrison, 2013) They were asked whether students unable to afford lights were excluded from activities or treated differently and whether students or parents had been unduly pressured into making purchases. Perhaps inevitably the results were still close to 100% positive and there may be subversive reasons for this (such as respondents not wanting to jeopardise further engagement with SolarAid) but the questions had at least been posed.

[24] Defined here as businesses without a specific social or development mandate

8.2 Comparative valuation of development benefits

The intention of both GVEP and SolarAid is to increase energy access. While they recognise livelihood creation as an additional bonus, they stressed that this was not an explicit aim and that the main goal would not be compromised in favour of creating or maintaining livelihoods, despite it offering further social benefits that can be monitored and reported, or in effect 'sold' as development services. The benefits from delivering large numbers of energy products have therefore been valued more highly than the benefits of supporting individual people's economic opportunities. With this in mind, the entrepreneurs or local dealers are therefore also continually being valued to see to what extent they are contributing to the overall delivery of product sales.

GVEP International

Depending on how DEEP entrepreneurs are valued they receive more or less support from GVEP, or theoretically risk being dropped from the programme entirely. The stated method is to value entrepreneurs according to the absolute number and/or growth rate of product sales. Yet it was interesting to observe that, contrary to management rhetoric, this did not always seem to be carried out in practice. The social benefits of providing economic opportunities for individuals did in fact seem to be highly valued by staff, particularly those closest to the entrepreneurs. This is best illustrated with a specific example of where low value in product sales did not lead to a group being evicted from the programme.

At the DEEP team conference in Kenya, there was much discussion about a group of women based in a rural area of Kiimani, north of Nairobi. They were producing and selling very few improved cookstoves despite having been part of the DEEP programme for some time. GVEP management had already highlighted earlier in the day that if an entrepreneur was not delivering sales as expected, they should be dropped from the scheme in order for a more effective entrepreneur to take their place. However, there was clear reticence to do this from the local team that had come to know the women personally. From a development and personal context, they argued that the possible social benefits of continuing to support these women to increase their output and sales even slightly was high enough to justify the continued time and energy used in doing so. The following is a conversational extract from the meeting where the DEEP mentor for the group debated with a visiting British manager from the London headquarters.

> Mentor: The Kiimani ladies make big liners, for upesi kuni mbili stoves. They have a stock of liners so they've stopped producing. Its 12 to 20 kms away to the market. They carry one but they're very heavy so there's a long time to recover to do it again. They need training and advice in making KCJ [Kenya Ceramic Jiko] liners, which are much smaller and more portable. That's what we're doing now.
>
> Management: Is it still worth it? They've already had some KCJ training and sales are still poor. It's always going to be a small business. What are the viable business opportunities for them? Other than linking with a direct buyer who buys on bulk because of very good quality (and that's probably unlikely) then it's never going to be a really viable business. It sounds tough to abandon people who are struggling, but we need to look at the overall scale aims.
>
> Mentor: But it's a hostile environment and there are limited income sources. They have a large stock as they work hard, it's just difficult to get them to market and they get undercut by another group who do have good transport links to the market. We can empower them by helping them to produce better KCJ liners and link them up with dealers who can be the ones who take to them to market.

This shows how the staff working directly with the women argued extensively for them to be kept in the programme, and although no decision was specifically made either way, they continued to receive GVEP support after the conference.

A couple of months later I was able to meet the women who did indeed live in a difficult area to access. After an arduous drive up a steep dirt track a long way from the tarmac road, including several stops where all passengers had to get out and help the four-wheel-drive over difficult sections, we finally had to continue on foot up a steep rocky track. When we eventually reached the small collection of homes in a clearing at the top of the hill, the women were assembled under the shade of a tree, many with babies strapped to them in traditional wrap-around shawls. They had originally been trained to make large and heavy kuni mbili[25] cookstoves by a development agency that had also helped them to build a kiln for firing the clay. GVEP had since trained them to make KCJ liners instead, but continued low sales levels were attributed to poor quality from their lack of experience with the new technique, as well as the ongoing market access issue. Despite the advice from management to drop them from the programme, the local GVEP team had continued to look for ways of resolving their difficulties. The purpose of our visit that day was to bring a cookstove dealer from Mombasa to the women in order for

[25] 'Kuni mbili' means 'two pieces of firewood' in Swahili.

him to show them the quality level he needed and to place a large order that would be collected directly from their village.

Photo 52: GVEP staff meeting with DEEP Entrepreneurs in Kiimani, Kenya

The staff of GVEP had all been employed by a development NGO and perhaps unsurprisingly seemed keen to see tangible social benefits being accrued by the people they had developed close relationships with. The aspirations and actions of individual staff are a key part of the socio-technical assemblage that is GVEP International. At the same time, in another department within the organisation, GVEP marketing staff clearly understand that potential supporters or donors will attribute value to individual entrepreneurs benefitting from DEEP and use personal case studies in the NGO's marketing material. The stories that are passed to them from the field staff tend to be about entrepreneurs that the mentors have developed the strongest relationships with, so that the strength of individual 'social' contracts, rather than more formal ones between the organisation as a whole and all of its supported entrepreneurs, come to both represent the project and steer its direction over time.

SolarAid

The interest of local SolarAid staff to support individuals was also apparent during the research and similarly recognised by SunnyMoney management, who specifically cited the need to convert development intermediary staff into targets-driven sales people as a difficulty in transferring from an NGO to a social enterprise approach. Unlike business people, it was felt, they did not always seem willing to

prioritise solar lantern sales above all else. On numerous occasions, the local team would divert from their intended operational activities in order to install an individual system in someone's house. Despite it being an inefficient use of time in terms of sales, and given that there were apparently sufficient instructions provided with the systems for the buyers to do their own installations, this may seem surprising. However from observation and conversations with them, it seemed the staff very much enjoyed enhanced levels of interaction with those that had bought solar products and were easily persuaded to help them on a practical level in order to make sure and see them benefitting from the systems as intended. They also felt that showing that SunnyMoney supported its customers well could only be beneficial for the business.

Again the official decision had also been made to value product sales above social benefits of those gaining income from involvement in SunnyMoney's supply chain. As discussed earlier, previously 'entrepreneurs' with low education levels and limited alternative income opportunities had been recruited and supported, but the cost of training people to become successful entrepreneurs was later seen to be excessive for the product sales achieved. The strategy was changed to only use already established sales people who would need minimal support since they already had demonstrable physical and cognitive capacity to be economic actors in a supply chain. Yet at the same time, relationships with the previously recruited entrepreneurs had already been established and these were not about to be severed. The staff appeared to put much time and effort into thinking about how they could continue to support them in a mutually effective way, in parallel with the new dealers.

8.3 Competition to deliver development benefits: inter-intermediary relationships

The time and resources that NGOs spend on fundraising, with advertising of benefits delivered being an important part of this, is known to be a key concern for donors and the public (e.g. Aldrich, 2009). Yet in addition to providing essential information for monitoring and learning, the qualification, quantification and then marketing of development benefits is needed to compete against organisations in the same field. Ly and Mason (2012) suggest that competition among NGOs can distort incentives in ways sometimes detrimental to an organisation's primary aims, causing inefficiently high spending on fundraising and diversion of funds from development projects. However, the market for the delivery of development-related

benefits is inevitably competitive, this being an essential feature of how markets function.

Carr et al. (1998) use approaches from psychology to show how NGO staff also have a group identity: contributing to the work of an organisation that is seen to be doing well, including in comparison to other groups, provides important motivation. The actions of individuals are therefore partly driven by a desire to be proud of the organisation they work for. As the director of DEEP said to staff at the programme conference: "You should be able to be proud of saying 'I facilitated x number of people to get energy access to clean energy services.' It's all about passion." Added to the knowledge that the future of their employment relies on the success of the organisation in selling its development services, the competitive nature of these organisations is clearly established. Some specific examples of how that competition manifests itself are given below.

GVEP International

Ten DEEP entrepreneurs out of the 30 spoken with (33%) said that they had initially been trained under a different NGO programme related to the energy technology that they now worked with. Another third had only had training for the first time from GVEP[26], but this illustrates the involvement of other NGOs over time. GVEP had one competitor in particular that was mentioned by many different staff members. This organisation (referred to here as Agency A) had supported various DEEP entrepreneurs either prior to or simultaneously to them being within GVEP's programme. Although development intermediaries might be expected to work together to maximise efficiency, or at least avoid duplication of effort, there appeared to have been little communication between these two organisations working in a similar field, with a similar approach and in some cases in the same geographical area.

The poor perception of Agency A was reinforced by the way that Agency A's actions were talked about between GVEP staff. Under DEEP, entrepreneurs were strictly not offered any direct financial assistance to cover costs incurred for training activities, although they might occasionally be provided with transport in a GVEP vehicle. By comparison, Agency A had a known policy of reimbursing travel costs and providing food allowances for any meetings or training events they organised. Agency A also appeared to frequently provide necessary manufacturing tools, such

[26] Of the remainder, four (13%) had developed their businesses under their own initiatives having seen similar elsewhere, while three (10%) had received training from another energy business, two (7%) from technical college and the last from a parent.

as cookstove liner moulds and kilns, free of charge, whereas GVEP promoted use of savings or micro-loans to finance these. This had led to some DEEP entrepreneurs who had been involved with Agency A understandably expecting the same treatment from GVEP. When it had been refused, several high-performing entrepreneurs had left DEEP. At the DEEP conference in Naivasha, this was communicated as follows to the full DEEP team by a staff member.

> [Agency A] is working in a negative way as our competitor. They told DEEP entrepreneurs that if they work with GVEP they won't get [Agency A] support anymore. The entrepreneurs came forward and made complaints about our lack of grants, so we had to explain we have a better purpose and that we won't provide grants just to compete with others. Those good entrepreneurs leaving to [Agency A] meant our overall performance dropped.

For some other entrepreneurs who did not have the option to choose Agency A over GVEP, their lack of motivation under DEEP was attributed to the same reason. At a meeting to discuss a particular cookstove manufacturing group the following explanation was given.

> This group was already involved with [Agency A] and getting grants. They then expected the same treatment from GVEP. But then because they were with GVEP it meant they were pushed out by [Agency A] so now they're a bitter group! They try to insist on being paid for going to meetings, even on top of being given transport costs, lunch and so on. Apparently [Agency A] always used to pay them for that, they call it a 'sitting allowance'. But DEEP doesn't give out fish, it shows you how to fish so you can do it for yourself.

The impression of Agency A amongst GVEP staff had escalated from one of them covering transport and food costs, to one of them giving general payment for simply attending training events. By comparison, the GVEP staff were proud that the DEEP approach was not to provide free money, only training to facilitate entrepreneurs to earn money. When asked in an interview, however, Agency A stated that their policy was indeed to provide a lunch allowance and transport costs for meetings and training, but nothing further. This was also verified by some of the other entrepreneurs I spoke to who had previously or continued to receive support from Agency A. It therefore remained unclear as to whether GVEP staff had gained an inaccurate impression of Agency A, or whether Agency A's policies on paying entrepreneurs had sometimes deviated from stated policy.

In the example of the Kiimani women described above, Agency A had had the first engagement with the women nearly twenty years beforehand, building them a kiln

and training them to make what had since been recognised as a large, heavy cookstove. However, support in finding ways to actually sell the stoves did not appear to have been provided. After the women had struggled to get them to market and stopped production, the kiln had gone into disrepair. This was the state in which GVEP had initially found the women and the kiln, so GVEP staff naturally had negative perceptions of Agency A further reinforced. In interview, Agency A stated that they did assist in marketing and establishing market linkages for cookstoves but admitted that they were experts in technical aspects of stoves, not in business, and that in fact it was their "area of comparative advantage." They often worked with local partners for the less technical aspects, so it could perhaps have been a failed partnership that resulted in the lack of market support for the Kiimani women. Other possible reasons for their apparently failed efforts include the limited range of efficient cookstove designs available at the time, or possibly even a decision to cease training the women after recognising the market access constraints. Unfortunately the interviewees at Agency A had not been with the organisation long enough to know the specific case, but it is easy to see how negative impressions are created between such directly competing organisations, with staff wanting to be proud and supportive of their own approaches.

Although an interview was not sufficient to gain the required level of insight to find out Agency A's exact impression of GVEP, an example from western Kenya given by a GVEP staff member illustrates that the processes on Agency A's side could have been similar. DEEP had provided the technical expertise to build a kiln for a new group of cookstove liner makers, but for some reason it had not worked as expected and the group complained that almost half of the liners ended up being misfired and unusable, which given the cost of firewood was a significant loss. Hearing that Agency A provided kilns for free, the group had approached them to ask for help repairing it, but Agency A declined because they knew that the entrepreneurs had previously been under DEEP. As soon as GVEP management heard about this and particularly that Agency A had been informed of the poor quality kiln, they highlighted it as a key reputation issues and made sure that it was replaced with a better kiln as soon as possible.

At the senior management level where staff were responsible for networking with possible partners and monitoring the overall development of sustainable energy product markets as a whole, it was interesting to hear that there had been high level meetings with Agency A that had already apparently resolved some of the issues described above. These had occurred some time previously and despite the

operational staff's continued perception of a strong rift between the two organisations, GVEP was in fact collaborating with Agency A on various other initiatives outside of DEEP. An amusing observation, but one that was met with contempt from operational staff, was that the biggest poster in GVEP's Nairobi office boardroom was in fact from Agency A.

The continued feeling of animosity between GVEP and Agency A amongst operational staff, even with bridges apparently having been made at senior management level, reinforced the desire to ensure GVEP was seen to be leading in its field to deliver development benefits and to ensure that competitors did not get that accolade. During a discussion on establishing co-operatives for manufacturing products such as briquettes, a member of staff highlighted:

> It's specifically in GVEP's interest to pioneer approaches and see them through, so that organisations like [Agency A] don't steal them and claim them as their own.

SolarAid

SolarAid's stated aim is to eradicate the kerosene lantern by making solar an alternative option. They therefore want to make pico-solar products available to as many people as possible and it might be expected that any way in which other organisations can help contribute to this would be appreciated. However, again there were visible aspects of competition where the need for SunnyMoney to specifically grow their own market share was made clear. Not doing so would affect their own sustainability as an organisation in both the solar lantern market and the development benefits market more generally.

The first time I heard what will be referred to as 'Agency B' mentioned was at a management meeting to plan for a forthcoming trade fair in Malawi's second largest city, Blantyre. Agency B was an NGO established by Europeans but based and working in Malawi to make sustainable energy solutions available for rural Malawians. As part of this they were buying solar lanterns from one of SunnyMoney's entrepreneurs in the capital city of Lilongwe and reselling them in the south of the country, the main area they worked in. The SunnyMoney entrepreneur was selling the lights at the standard retail price advised by SunnyMoney so that Agency B were having to add their own costs to this and resell the lanterns at a mark-up price. This had not previously been seen as a problem since SunnyMoney did not have entrepreneurs established yet in the south, but Agency B had heard of their intended presence at the trade fair and got in contact to ask them not to attend because Agency B was already planning to be there, selling

the same products at their higher prices. This was not well received by SunnyMoney staff, who had developed a reluctance to sell products to Agency B at wholesale price, citing it as a moral issue since they could not guarantee that Agency B would not continue to over-price them.

At the trade fair a few weeks later, staff from Agency B came to SunnyMoney's stand to pay for and collect some solar products that they had ordered the previous day. No mention was made of the communications a few weeks previously and Agency B staff said that they were happy to avoid the transport costs usually incurred when buying the lanterns in Lilongwe. One of the SunnyMoney staff was in the process of putting up 'sale' posters to advertise a newly discounted price for the same lanterns that Agency B had come to buy. However, the staff member then proceeded to charge the Agency B staff the non-sale price. I asked whether they should be offered the same sale price as all other customers would be that day, but the staff member replied, in front of Agency B, that they had been specifically instructed by management not to sell to them at reduced prices. After some debate, Agency B was finally sold the lanterns at the sale price; the staff member seemed pleased and returned several times during the day to buy more stock.

I spoke to SunnyMoney's country manager about the relationship. He explained that since Agency B was a European-backed NGO, he felt that selling them warehouse stock at wholesale prices might result in them developing their own distribution channels in the south. They could thus end up dominating the market there, before SunnyMoney had a chance to try and establish their own channels[27]. SunnyMoney's smaller-scale entrepreneurs and dealers had limited capital available for buying stock and therefore bought in small batches. Agency B, by contrast, could potentially buy up SunnyMoney's entire stock and leave them with nothing for their own distribution channels. Imports of solar products could take up to six months in total for ordering and delivery to Malawi and in the meantime the businesses and confidence of the smaller entrepreneurs and dealers would be jeopardised. SunnyMoney did have a relationship with another NGO where they specifically ordered consignments of stock for that NGO's own entrepreneur network, at the same time as providing technical training and ensuring that products would be sold at the correct retail price. SunnyMoney's manager felt that a similar arrangement with Agency B would be acceptable.

[27] A SolarAid manager later commented that the Malawi country manager's contract had been terminated shortly after my research and that his point of view regarding the relationship with Agency B should not be considered as applicable to the organisation as a whole.

At a later meeting between the managers of the two agencies, Agency B had apparently declined the proposed new arrangement, stating that they did not in fact have the capital to buy whole consignments of dedicated stock so far in advance. They were therefore happy to keep buying at retail prices and selling at a mark-up, but now asked to establish an agreement with SunnyMoney to not sell "in each other's areas". The SunnyMoney manager responded that while they were not specifically targeting the south yet, if small dealers came to them to establish links they could not necessarily refuse. It was not up to SunnyMoney to tell their dealers where they could and could not sell the products and they felt that "there's enough market to go round still". Agency B responded by complaining that SolarAid was losing its status as an NGO, as they were now selling to anyone and everyone, giving the example that "they are even selling to Indians" who were perceived by Agency B managers to be ruthless businessmen that did not need the income and had "no particular interest in helping people". Agency B's association of SunnyMoney with the delivery of development benefits therefore appeared to make them feel that SunnyMoney should not act in the way of a standard business or engage with non-development actors. Only people that were also dedicated to delivering development benefits or had a more obvious need to find income opportunities should be allowed in the distribution channel. Rather than allowing competition with other NGOs, they should also make an agreement to segment the market and not "tread on each other's toes".

It is likely that this example occurred between development intermediaries in Malawi in particular because the pico-solar market was in its infancy and SunnyMoney was the sole importer of most of the different brands of solar lanterns. By comparison, in Kenya and Tanzania all of the main pico-solar manufacturers had in-country presence and their own fairly well established distribution channels. SunnyMoney was operational in both of those countries too, but due to the higher levels of competition had had to develop its own niche way of establishing distribution through targeting rural schools in the first instance. It had turned out to be a very successful way of marketing the products to large audiences quickly and catalysing demand in new areas. Via senior management meetings this approach had followed through to SunnyMoney's business strategy in Malawi, but with much less competition there it was taking longer to shift operational activities away from the more conventional but slower method of simply looking for new dealers.

Photo 53: SunnyMoney's new strategy: starting with school children to catalyse markets in new areas

There appears to be an expectation that development organisations are more likely to collaborate than businesses as they are all pursuing the same goal. However, their own success in contributing to those goals is still key in their continued existence as organisations and paid employees. The marketing director for d.light in East Africa expressed it well when describing the expectations of Lighting Africa, an IFC/World Bank umbrella organisation established to support rapid market growth of high quality pico-solar products in sub-Saharan Africa.

> A lot of other organisations that started as NGOs are turning to the same approach as d.light and becoming enterprises. But we are a commercial enterprise, even if we have the prefix of social – so we are definitely in competition with those others! Lighting Africa keep asking everyone to come to meetings and asking our views. But they don't have any concept of competition! They can't understand why people don't want to open up when Barefoot, ToughStuff, d.light and so on are all in the same room! We do go together to lobby government though, on issues like VAT, taxes, etcetera, things that affect the market for all of us, and we would probably do this through Lighting Africa. But we're not about to reveal all of our operational secrets to each other!

8.4 People and relationships: interactions and power dynamics

The discussions above have shown how the aspirations, motivations and perceptions of individual staff and the relationships between them all affect the decisions and actions they can and do take. These actions may or may not be in line with the organisation's official policies and strategies, yet manifest themselves as the behaviour of the organisation as a whole entity. Furthermore their cognitive skills, social networks, technical tools and operational aims in at least two different markets (energy products and development benefits) all combine to form the agency of the organisations as both development actors and market actors.

A key aspect of viewing development intermediaries as socio-technical assemblages is that, as per actor-network theory, networks (with humans and non-humans) constitute their agency. From the human network perspective this illustrates the importance of analysing relationships. At the entrepreneur recruitment stage, outlined in Chapter 0, the networks of the development intermediaries and their partner organisations were seen to be crucial in finding prospective actors willing and suitable for being absorbed into the marketisation programmes. The relationships between mentors and energy entrepreneurs under DEEP have been seen as a key enabling and shaping feature of the programme. A focus on relationships can also reveal power dynamics.

On arriving at the research sites, I found ways in which both case study organisations were quite different from the picture portrayed by older academic literature critiquing development approaches. Staff in the African offices were predominantly national citizens. Although there were several Europeans in GVEP's Nairobi office, none were working on DEEP. In both the Ugandan GVEP office and Malawi SunnyMoney office I was the only non-national present. There were still some resemblances of the stereotypical image of development equalling expatriate westerners travelling in large white four-wheel drive vehicles, but since I was the only expat and there was only one vehicle per office, local transport such as motorbike taxis were used for field visits in most cases. The interaction with local entrepreneurs was often noticeably different depending on the vehicle used, with the people being visited seemingly subsuming it into the identity of the visitors. Two DEEP entrepreneurs making biomass briquettes in Uganda, for example, said that after having us visit in a big white truck, including myself being there as a

'mzungu' (white person), they were worried that they might be robbed, with people assuming we had brought them money.

Photo 54: A GVEP vehicle outside the house of a DEEP entrepreneur in Uganda

By having predominantly local staff, however, this type of reaction was not a feature of everyday practices of the NGO and rather one that made me reflect on the impacts of my own research. In the standard routines the mentors undertook visits on their own. As they had been intentionally recruited from the areas they supported, there was certainly no evidence of development dualisms in the operational activities at least, even if they remained in the underlying documentation (discussed below). As described in Chapter 0, one of the initial DEEP entrepreneurs had even subsequently become a DEEP employee, working for GVEP's technical partner.

The staff structures of the two organisations are described in Chapter 5. Because of their origins as British organisations and the role of staff in the London offices of securing donor funding, power balances were inevitably in favour of the charity's directors sitting in the UK headquarters. However, examples such as the Kiimani women being allowed to stay in the programme is one of many examples where local staff were given flexibility to undertake their operations as they saw fit, within reason. Ultimately, the demands and expectations of DEEP donors and potential future donors were the overall drivers and as long as these were being fulfilled it seemed that staff at different levels were allowed relative autonomy. The DEEP conference that I attended in my first month at GVEP in Kenya showed that all staff members from all offices were able and willing to communicate directly with each other, and staff at field level, generally with the strongest understanding of local

contexts, appeared to be able to feed ideas for changes or future project designs back to senior managers either directly or via the line manager hierarchy.

By comparison with the more senior staff, however, those specifically employed for DEEP such as the mentors did have reduced job stability because of the limited timeframe of the programme. There was a similar situation for SolarAid where, because of the continued need to use money from donations to cover operational expenditure, budget for permanent employees was restricted. Thus various staff were not employed on permanent contracts, despite their regular use by the organisation as paid 'interns'. Their precarious positions appeared to cause potentially unnecessary stress but it was stated that this was only a temporary measure in the current absence of adequate finances for employing more permanent staff. Similar zero-hour contracts have been being highly criticised in the UK. Overall, however, the small SolarAid office in Malawi had a relatively level organisational structure, besides the Country Manager responsible for the team's work overall.

8.5 Discourses: from development to markets

The guiding discourse, models and tools drawn upon by the individuals working for development intermediaries constitute a significant aspect of the organisations as assemblages. As development intermediaries in the first instance, the underlying documentation of both case study programmes can be argued as typical in the international development arena. DEEP's over-arching guiding document was the proposal written for the European Union's Energy Facility, under which it received half of its funding. Like most development projects, it features a 'Logical Framework'. This key document (Appendix D) summarises in the rows of a table the programme's overall objectives, its expected results and the activities that will achieve them. Each is described further under the adjacent column headings of 'intervention logic', 'objectively verifiable indicators', 'sources and means of verification', and 'assumptions'. The language used is clearly the current language of international development, with descriptions including target numbers of 'beneficiaries', how 'stakeholders' and 'communities' will be engaged with, the design of the 'M&E system', and how 'sustainable development' will be ensured. The Logical Framework acts as the starting point and overall guidance for the programme and as such anchors its position within development discourse from the outset, including perpetuation of the long-critiqued dualism of developers actively developing and beneficiaries passively receiving (e.g. Crewe and Harrison (1998)).

Contrary to this, however, all of the operational staff talked about DEEP activities in business terms, with in fact fairly little use of these more traditional development terms.

SolarAid equally has a key development document for SunnyMoney, this time a 'Theory of Change' (Appendix D) that was developed in 2011 with support from a registered charity that provides development consultancy. The Theory of Change "maps a causal pathway towards a mission, defines the building blocks required, articulates underlying assumptions and identifies measurable indicators of success" (SolarAid, 2012). It is a newer model for development intervention frameworks that has been particularly advocated by the UK Department for International Development (DFID) since 2010 and "reflects a need to re-emphasise the deeper analysis that the original Logical Framework Analysis was designed to elicit but that has recently become a more superficial contractual exercise" (Vogel, 2012) (p.3) The intention is therefore to promote more awareness of underlying assumptions and intended pathways, moving away from a straightforward linear approach that shows activities inherently leading to the achievement of goals. Interestingly, SolarAid's theory of change shows a shift from development discourse to market discourse, with no mention of beneficiaries for example, only 'customers'. This change in underpinning discourse reflects SolarAid's intention to re-brand itself under the SunnyMoney label, purposely not including 'aid' in its title, as a credible market participant. The rhetoric used has become 'economic', similar to the way that those absorbed into the SunnyMoney supply chain are reconfigured as economic actors.

Performativity of economics

Just as development discourse and its related theories, models and tools affect the perception and performance of development activities, as keenly highlighted by 'post-development' writers in particular (e.g. Ferguson (1994)), so economic discourse affects the processes of marketisation. The way in which the local entrepreneurs in the new distribution networks are trained in business methods has already been discussed in the previous chapter. The actions of market-making development intermediaries were also seen being directly affected by recent economic theory in other ways. One example was the price-setting activities of a new cookstove distributor in Uganda, 'Up Energy', described by its business development manager as "a for-profit business with a social and environmental agenda" (Up Energy, Interview 12, 2012). Similar to SolarAid, its aim was catalyse the cookstove market by becoming an importer and reseller of products designed in

the US and made in Kenya and China. They had engaged GVEP to help train new sellers in their distribution network. Their business model was to receive funding from the sale of carbon credits (facilitated by Impact Carbon, as discussed in Chapter 6) that would allow the stoves to be subsidised, so they needed to set the level of subsidy and find a relevant initial price for the stoves. The organisation's Chief Operational Officer was based in San Francisco at the University of California, Berkeley, and they therefore engaged a university research team to help them undertake pricing studies. This marked the start of a complicated system of 'willingness to pay' trials that used a sophisticated second price auction system, a technique that has emerged from in-depth academic analysis of auction design.

Three sites in Uganda were selected for the pricing trials, two in rural areas and one in a semi-rural setting in the suburbs of Kampala. Through communications with community leaders, groups of local women were invited to attend each event and asked to bring money with them. There the cookstoves were demonstrated to the women who were then asked to write sealed bids stating how much they would be willing to pay for them, firstly in one up-front payment (a 'spot payment') and secondly in a smaller up-front payment followed by additional instalments over time (a 'time payment' model.) It was explained that the second highest bid received in both the spot and time payment auctions would be accepted and that the women who had entered them would then need to pay the prices they had offered. They were asked to bid on three different types of stove but it was stressed that they would only be obliged to buy a maximum of one. In order to become familiar with the auction design, they practised first with small sweets.

During the first event in one of the rural locations, various problems were encountered, such as confusion of the women over whether they would have to pay the price they offered or not and a lack of awareness (or inability) to bring money with them. The bids received varied hugely and this was seen to partly result from lacking 'seriousness' of the bids since many women knew that they did not have the money to buy in any case. The following was written in the study report:

> Despite the fact the organizers have contacted repeatedly both community leaders and government community organizers ahead of the event to remind them to bring money to the event, participants have repeatedly told us that their payments were affected by not knowing that they should bring money. In order to counteract this, the organizers could visit community leaders at least one week ahead of the event first to sensitize them about the importance of bringing money, then to get the

> phone numbers of all participants, and lastly to SMS [text message] all participants to remind them to bring cash. (Up Energy, 2011)

After all three rounds had been conducted, the average bids that had been made were found to be much lower than expected, and in many cases the women offering the supposedly binding second highest prices had not been able to pay. Up Energy management stated that the initial prices ultimately set for the stoves were roughly set at the level of the second highest spot payment prices from the semi-rural pricing study, although these were higher than those offered in the rural areas that were more representative of the intended customers. It was felt that this was reasonable, however, as the low prices offered might reflect the 'bargaining factor', whereby the final price paid could end up being lower than the set retail price in any case. It was also decided not to offer a time payment option as it would be too administratively onerous. I was unfortunately unable to observe the trials that had taken place a few months previously, but it was fascinating to hear of this juxtaposition of advanced economic theory with daily Ugandan village life, more commonly linked to western-originated rhetoric and models through the frame of international development.

As well as seeing modern economic models being used in a possibly helpful, if optimistic, way, there was also a feeling amongst some staff of the development intermediaries that having the programmes tied to advanced economic models and tools could sometimes be detrimental. An example from the previous chapter is the interpretation of suitable credit services for DEEP entrepreneurs being in the shape of formal bank loans only, in line with the desire to help entrepreneurs move from the informal to the formal economy. This was felt to be associated with the dismissal of possibly more appropriate locally developed solutions such as village savings and loans associations.

Performing investor-ready, not donor-dependent, contexts

Regardless of the structure of marketisation actors, market facilitation approaches provide an increasing need for investors rather than donors – even if NGOs are seeking investment for enterprises they are supporting rather than their own organisations. A knock-on impact of this is a reduced need and in fact possible drawbacks of development discourse perpetuating a negative view of developing countries, as argued by post-development critics. Enough must be done to give meaning to goods conceptualised as 'humanitarian', but a conducive business environment also needs to be presented in order to show that market projects are

viable. Could this help shift discourses away from the developed-developing dichotomy? In fact, neither case study organisation frames itself as directly supporting 'development'. Besides the DEEP Logical Framework, both organisations' websites limit references to development to 'business development' or within staff backgrounds highlighting their previous work experience 'in the development sector'.

Something that came to mind during the research with these 'development' organisations using market-based approaches was the similarity to experiences in the UK. As preparation for the fieldwork, I undertook ethnographic analysis of a micro-generation services company in Edinburgh in the UK. This company also required support from non-commercial entities in order to facilitate and become part of a relatively new market for micro-renewable energy technologies. They engaged with the development of and subsequently benefited from a government-led quality standard system (the Microgeneration Certification Scheme) to ensure quality of suppliers and products, thus helping increase confidence amongst potential consumers. They also gained significantly from publicly funded and non-profit initiatives such as the Energy Saving Trust and Community Energy Scotland. These organisations promote awareness of sustainable energy solutions for households and community-based organisations, link potential customers to suppliers, and provide various grants for energy product purchases. The company was a member of non-profit industry associations that promoted their technologies, facilitated communication channels with other market actors and provided government lobbying support. Although renewable energy technologies in the UK might not be able to be framed as humanitarian goods, they are certainly framed as 'environmentally-friendly' goods, equally promoting engagement from socially conscious investors and grant providers.

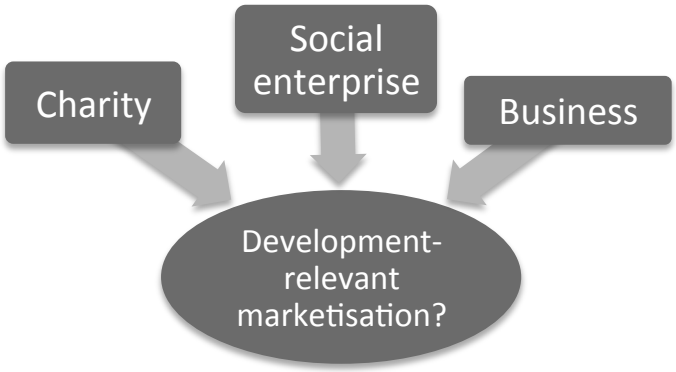
There are still obvious differences between market development in Africa and the UK (different consumer demands and existing product availability; different legal frameworks and extents to which they are or can be relied upon; different market practices such as in advertising and sales), but there are also plenty of similarities in the processes involved. In fact there appears to be limited benefit in overly grounding the case study programmes observed here in 'development' rhetoric simply because of their location. Interestingly some of the products observed that were specifically designed for 'BOP' consumers have also seen demand in western countries after being marketed for off-grid applications such as camping. Adoption of market-approaches by 'development' intermediaries, whilst not able to entirely

allow traditional development tools and discourses to be abandoned, at least seems to incentivise promotion of a more positive image of geographical contexts and favour market terminologies over development dualisms in practice.

8.6 NGOs, social enterprises and businesses as development-relevant marketisation actors

Having discussed various characteristics of the observed market actors, an overview is provided here of how the positioning of organisations, whether as charities, social enterprises or businesses, appears to affect their agency in marketisation activities associated with 'development' benefits.

Figure 52: Different types of macro-actors undertaking development-relevant marketisation processes



Traditional development intermediaries[28] as marketisation actors

GVEP remains an NGO, entirely reliant on rounds of development funding. The donors to DEEP insisted that kerosene and charcoal sellers be removed from the programme, even though supporting them to offer sustainable energy products to their existing customer base might have been an effective strategy and limited adverse impacts of growing markets for competing products. There will always be limits to what can be shaped and qualified as development-relevant, however, and it can be argued that reliance on donor funding will always leave NGOs constrained.

SolarAid originated as an NGO, but has now adopted a hybrid structure of part NGO (SolarAid) and part social enterprise (SunnyMoney). The NGO part is reliant on donations, including charitable fundraising and donated profits from the UK

[28] I have used the term 'traditional development intermediary' to describe organisations that do not undertake any income-generating activities, thus being entirely dependent on donor funding.

company that established the NGO (Solarcentury), rather than any significant long-term 'development' donors. Because of this situation, when SolarAid's management felt that undertaking the dual activities of supporting local entrepreneurs who might otherwise have limited income opportunities whilst also catalysing a market for solar products was not effective, they were freely able to change strategy to recruit only established sales people, despite losing the 'development benefits' of providing new income-generation activities. Their new approach is in fact leading to more extensive sales, numerically and geographically, and a focus on school children needing lighting to study as an entry in to new market areas also provides plenty of opportunity to framing solar lanterns as humanitarian goods as necessary.

NGOs having to frame their activities as 'development' relevant may restrict the opportunities for supporting the marketisation of products that are harder to conceptualise as humanitarian goods. It could be difficult to find a suitable problematisation for solar-powered TVs, for example. Other restrictions include the type of market actors supported. In his review of business in Africa and the varying initiatives to support it, Taylor (2012) suggests a fixation of development actors with small enterprises. DEEP is no exception, tied to supporting 'micro and small enterprises' by a statement in its Logical Framework. Larger organisations can be worked with under DEEP, but once they are a certain size and level of formality they are suddenly re-imagined as 'associate partners,' too large to be in direct need of development-related support. That is instead offered to the entrepreneurs in their newly developing supply chains instead, although this also clearly benefits them indirectly. Many of the new associate partners in DEEP had originally been constructed as 'in need of development' within DEEP or other NGO programmes but had since out-grown that conceptualisation. It appears hard to frame supporting larger enterprises as a development relevant activity, although GVEP is making progress in that since DEEP through new initiatives such as their 'Advisory Services' and 'Supporting Energy Small and Medium-Sized Enterprises' (ESME) initiatives. Within DEEP, the graduation of enterprises from small informal start-ups to larger capacity, multi-staffed and at least partially formalised market entities worthy of recognition as a 'partner' suggests that the marketisation aims of NGOs can be achieved over time, even if this might sometimes only happen over the course of engagements with several NGOs and/or funding cycles. Bailis et al (2009) demonstrate this through a description of repeated donor-funded projects that appear to have finally made progress in marketising the Kenya Ceramic Jiko (KCJ) after significant time and expenditure.

A reliance on fixed-term funding packages in the past has not stopped traditionally-structured development intermediaries from performing integral supply chain roles on a temporary basis, distributing products such as solar home systems in bursts of activity before ceasing all local presence when the funding cycle ends. Subsequently an NGO-sized hole is left in the fledgling market infrastructure (Figure 53). This was another motivation for SolarAid to set up SunnyMoney, allowing it to become an integral part of the pico-solar market in Malawi on a hopefully more permanent basis. GVEP, on the other hand, has developed a marketisation approach that allows it to step away at the end of the funding package without taking an essential part of the market system with it. Instead, if successful it will leave an array of new economic actors performing market roles for the long term. GVEP's role is as a broker and service provider, providing market-consolidating training and linkages. The benefit of being non-profit, of course, is that these services can be provided to actors who do not have the financial resources to pay for them.

Figure 53: Illustration of why NGOs dependent on short-term funding packages adopting integral market roles may not lead to long-term marketisation

Social enterprises as marketisation actors

Although still operating to some extent within the market for development benefits[29], social enterprises also have the freedom to focus on becoming financially self-sustainable businesses. These quasi-development actors now often employ reputed business people instead of experienced development actors. SolarAid

[29] Examples from SunnyMoney and other social enterprises interviewed include: targeting 'impact investors,' seeking grants and funding awards, and looking to sister NGOs (such as SolarAid) to receive donations on the enterprise's behalf to supply additional operational funds.

management in the UK, for example, noted that the birth of SunnyMoney created a need for new staff training and a shift in organizational attitudes, systems and recruitment strategies.

> We're getting better at procurement, logistics and marketing. We've recruited top talent onto our board, including Derry Newman, former MD of Sony UK, who is bringing a rigour and analysis to our decision-making. We're now bringing in performance management systems, enterprise resources systems, direct marketing expertise; everything that will give us an edge and keep us growing faster. (Andrews, 2013)

This specific attempt to convert the cognitive skills and networks of the organisation's staff to those of experienced business people already conversant with market concepts and strategies indicates a concerted effort to enhance the agency of SunnyMoney as a marketisation actor. From the organisation's sales data it would suggest that this is having its desired effect, as indicated in this post by the SolarAid and SunnyMoney CEO on the internal staff blog in December 2012.

> Two weeks ago I attended the World Bank/IFC Lighting Africa conference in Dakar along with some colleagues. At breakfast on the first day, we speculated as to whether SunnyMoney is the biggest last mile seller of solar lights in Africa; or whether that accolade still sits with the French oil giant, Total. Total sell portable solar lights in a number of African countries, through their petrol station forecourts, as well as via other distribution networks they're working hard to establish. At SolarAid and SunnyMoney, we have huge respect for the work Total are doing – and will do all that we can to encourage and support it – but it's hard not to be a bit competitive! So we smiled when we learnt that they have sold 111,000 solar lights in the last three years. Here are our latest figures:
>
> Sold in the last three years: 203,000
>
> Sold in the last seven months: 137,500
>
> Sold in October 2012: 35,000
>
> We believe this makes us the biggest last mile seller of solar lights in Africa; probably by a big margin if you look at our current run rate. We're very proud that a small social enterprise has knocked an oil multinational into second place. We're not just proving that we know how to sell solar lights; we're proving that social enterprises can be an extraordinarily powerful force in today's economy.
>
> (Andrews, 2012)

If marketisation is considered in terms of total sales of a product, the social enterprise model certainly seems to be working. After working hard to move away from its charity-based origins, the SunnyMoney team has developed a successful market entry approach that targets schools in order to catalyse wider interest in solar lanterns in new market areas. NGOs have sometimes been critiqued for their lack of accountability to the actual 'beneficiaries' of their services, instead prioritising donor needs in order to ensure their financial sustainability. By contrast, the relationship between social enterprise and 'customers' is based on market exchange; if someone does not perceive value in a product they will not engage in an exchange. The ability of SunnyMoney to rapidly spread awareness of the potential value of solar lanterns to schoolchildren and more broadly has therefore been key to their success.

Following exchange, a purchased product also needs to adequately deliver on the value that its buyer envisaged. Only then will they be persuaded to engage in further exchanges or recommend others to, thus sustaining market processes over time. A social enterprise therefore has continued motivation to be accountable to consumers beyond just an initial purchase. However, it is still early in the history of the pico-solar market, particularly in Malawi, and it is perhaps therefore imprudent to cite high sales volumes as indicative of successful long-term marketisation. Earlier development initiatives that provided free solar systems under short-term projects would also have offered total numbers distributed as a straightforward indicator of success, yet it is now known that a lack of enduring local repair capacity often lead to obsolete systems in the longer term and a resultant mistrust of solar technology. In this current wave of social enterprises, initial distribution models appear to have become a central focus, but broader efforts to create the full socio-technical assemblage needed for an enduring market in the longer-term sometimes seem to be limited. Barefoot Power appears to offer a potentially promising model of service centres in Uganda, but at the time of research in Malawi, SunnyMoney had not yet developed a locally viable after-sales service system. If the enterprise is to be successful in the longer term via its business model rather than donor funding, then this could be a key marketisation aspect to focus on.

The social enterprise is a relatively new form of market entity, but one that continues to evade specific definition. From the above discussion, it appears that the language and tools used are primarily 'economic' rather than 'development,' yet activities can be framed in the latter context when necessary. Like SunnyMoney, all of the 12 social enterprises I interviewed people from (Appendix B) had at least

initially been, and often continued to be, reliant on some form of grant or other charitable funding, generally to provide start-up capital. This is a clear benefit of having the 'social' prefix before enterprise. One interviewee in Kampala[30], for example, confirmed how difficult it was to move their briquette-making social enterprise from development funding (grants) to standard investment because of their inability to guarantee returns of 15% that investors repeatedly demanded.

In order to be eligible for development funding, many of the organisations encountered had sister NGOs, registered as charities in the relevant western country and, like SolarAid, able to channel start-up and operational funds as necessary. For the social enterprise side, there is often no legal difference in structure to a standard business limited by shares. Instead their differentiation tends to take the form of a mandate written in to their mission statements. However, without specific regulations or accountability frameworks other than the standard financial ones, there are no actual requirements to provide or act on that mandate. If a business wants to try and market itself as a social enterprise, it can. Santander Bank PLC, for example, can be found listed amongst the self-declared members of Social Enterprise UK (Social Enterprise UK, 2013).

A new hybrid legal form has been introduced in the UK called a Community Interest Company (CIC) that can be limited by either shares or guarantee and has a designated regulator (UK Department for Business, 2013), but there is no obligation for social enterprises to use this structure. Equally in the US there are now various options in different states, such as a Low Profit Limited Liability Company (L3C), a Benefit Corporation (B-Corps), or a Flexible-Purpose Corporation. The requirements for each vary, but all have some accountability framework (Westaway, 2011). Although all these structures are optional, their use does increase the credibility of a social enterprise, useful if they are seeking 'impact' or 'social' investors or being supported by sister charitable organisations. Such structures have yet to exist in most African countries, however.

Mainstream businesses as marketisation actors for 'development'

Due to the nature of the case studies chosen and the other organisations interviewed, the focus has been on development intermediaries in the form of NGOs and social enterprises. Some large multinational corporations were also encountered such as the oil company Total, mentioned in the above excerpt from SunnyMoney's CEO as one of their primary competitors in solar lantern sales (in Kenya). Although

[30] Organisation name kept confidential

theoretically Total's managers could endeavour to frame their company as a social enterprise, this might be a difficult task. In order to differentiate, businesses without a specific social or development mandate are referred to as 'mainstream businesses' here.

There has been an increasing call for businesses to become involved in what have traditionally been seen as development sector tasks. Some examples of business and development actor partnerships and corporate social responsibility (CSR) initiatives have been summarised in chapter 2. Further examples were identified during the research of sometimes hidden roles of large multinationals in clean energy product markets. In some case these were through CSR initiatives kept separate from the central task of a business, such as the Shell Foundation, established and funded by the Shell Group (a global group of energy and petrochemicals companies) as an independent charity. It supports development of sustainable enterprises by providing seed funding and business support (Shell Foundation, 2005); one of its recipients is Envirofit International, the social enterprise that designs, manufactures and distributes Envirofit cookstoves. In other cases such CSR initiatives were more aligned with mainstream business activities. Barclays (a global banking company), for example, were interested in supporting GVEP entrepreneurs through reduced interest rate loans partly in order to secure potential future customers, and partly as a CSR venture to be advertised in marketing material. GVEP managers also heard that Unilever (a global consumer goods company) was arranging to promote their packet food lines by giving away free samples with Envirofit stoves, facilitated by their being a financial partner in a new Envirofit distribution project in East Africa. These types of initiatives fulfil the vision of Prahalad's (2010) 'interconnectedness of players in BOP markets' (Figure 4 in Chapter 2) whereby private enterprises combine with development actors and local BOP entrepreneurs.

Any reliance on framing marketisation activities as 'development-relevant' creates restrictions, suggesting that mainstream businesses that are not trying to straddle two markets may have an advantage. Without having to squeeze the products they supply into the label of humanitarian goods, their role is much more straightforward. The notion of 'Africapitalism' promoted by Nigerian businessman Tony Elumelu (2013) suggests that if mainstream business prioritise investment in African countries it will help bring about the 'development' that international development practitioners spend significant efforts and money trying to achieve in other ways.

On the other hand, without any need to frame their activities as delivering social benefits, there is equally no inherent check on the impacts of mainstream businesses' marketisation activities. People can be conceptualised as at the 'bottom of the economic pyramid' because they have very limited financial resources. Encouraging businesses to persuade them to spend money on goods that might not enhance their living standards, and on the contrary may be detrimental, inevitably has risks. A high profile example that has been under debate since the 1970s is Nestlé's aggressive marketing of baby milk formula in developing countries where it is often difficult to source clean water (Fitzpatrick, 2010). The issue here is not necessarily that powdered milk cannot be framed as a humanitarian good, rather that the end-users do not always have the physical means to engage with the product in a way that allows performance of the humanitarian aspects in practice. Although this is an extreme example, it does offer one counter-point to the simple 'business as development' argument. Whose role is it to educate and protect 'BOP' end-users in their new economic roles as consumers? Social enterprises have an external pressure from their socially conscious stakeholders to monitor their impacts and ensure that they are not inadvertently inflicting harm. Such pressure might not be so directly felt by mainstream businesses.

Even selling solar lanterns and cookstoves that do not then perform as advertised can be seen as irresponsible when the target market has such limited resources. If the market devices designed to protect product buyers, such as warranties and quality standards, cannot be enforced then BOP consumers are left in a vulnerable position. The power balance rests firmly in favour of manufacturers and importers, at least until the collective purchase power of consumers rebounds against them. If this happens, however, it is still likely to be the newly shaped micro-entrepreneurs that feel the impact the most.

8.7 Implications of competing types of market-making actor

As described earlier, competition is a fundamental market characteristic. However, there are some implications of having a diverse range of entities trying to establish markets for the same products. A standard business must be profitable to survive, and as long as all businesses rely on straightforward product sales and have access to the same resources, it helps ensure what economists call a 'level playing field.' For sustainable energy products, however, this can in fact be jeopardised by their status as humanitarian goods, which can be used as justification for subsidised

distribution approaches. As a representative of the social enterprise Solar Sister in Uganda commented, for example:

> Our biggest competition is the NGOs. They want to give out products for free. They say they want to make sure people have light. So Solar Sister women can't do her business because an NGO has given them out for free or subsidised. It undercuts the market completely. It breaks the trust of the customers as they feel they're being cheated then. (Solar Sister, Interview 19, 2012)

The solution is not necessarily to advocate an end to all subsidisation, which can still be seen as a key tool for market actors and a ban on it is unlikely to be implementable in any case. SunnyMoney, for example, offer each school child in the new areas they enter the opportunity to buy one small solar lantern at a discounted price. This specific context and limited availability of a subsidy is designed to help more students afford at least a simple light, thus exposing more students and their social networks to solar lanterns, without distorting price expectations. Care must be taken, however, that this last condition holds true. A DEEP solar entrepreneur in Kenya explained that ToughStuff solar lights were not popular with his customers because of their pricing history. Their initial entry into the country was financed by a donor who insisted on subsidising the products, resulting in a near 50% price reduction for the first year. This led to sales of over 10,000 lighting kits, but when the donor left they had to increase the price back to the standard retail price. It became impossible to sell products that people had been buying for half the price previously. This issue is already compounded with the historical legacy of the aid model meaning that many Africans associate development initiatives with free products.

Altenburg and von Drachenfels (2006) draw attention to a 'new minimalist approach' to private sector development that advocates abolishing programmes that support individual sectors or enterprises because of concerns that they do not ensure a level playing field for all market actors. As they conclude, however, this seems an extreme solution. Another productive marketisation activity, therefore, is to provide communication channels between market actors to discuss such issues. Lighting Africa provides an African-wide channel for those involved in pico-solar markets, and individual countries often have their own sector associations such as the Kenya Rural Energy Association (KEREA), an independent non-profit organisation for renewable energy industry stakeholders. Conferences and increasingly online forums provide such channels too. For all domestic-scale sustainable energy products, the online LinkedIn site of the UN's Energy Access

Practitioners Network is particularly active, and for lighting products specifically 'LuminaNET' is: "a social network for the global off-grid lighting community" developed by the US Department of Energy's Lawrence Berkeley National Laboratory (LuminaNET, 2013).

To give an example, an announcement by Coca-Cola to enter a partnership with a solar lighting company in Kenya that will provide their rural retailers with solar lighting (The Coca-Cola Company, 2013) led to the following post on the Energy Access Practitioner Network's LinkedIn site.

> The old dependency arguments spring to mind and I don't mean caffeine addiction. The article does not say but I assume these are being 'given away'? This does nothing to create a local market for these types of products and may actually harm attempts to establish one. This old model of 'aid' needs to be replaced yesterday. (Network Member, 2013)

A representative of the partnering company, One Degree Solar, made an unprompted response on the same thread the next day to resolve the issue. They explained that Coca-Cola were providing the introductions to the retailers, financing a pilot project involving 100 systems and covering the operational costs that would allow the bulk of the systems to be offered at standard retail price but on a credit basis (i.e., to be paid back over time.)

After this clarification, others on the forum seemed appeased that in this case the market was not being distorted by subsidised or free products. Where this is currently a new concern for some market actors is in the context of carbon finance. As discussed in Chapter 6, carbon credits are theoretically available for solar lanterns, but as the administrative burden is high and the number of carbon credits received per product low, the impact appears to have limited effect on product pricing. For cookstoves, however, the situation is more complex because the potential income generated by each cookstove from carbon credit sales is very high. For cheap cookstoves it can in fact exceed their cost price, making it viable to establish projects that distribute cookstoves for free and still make sufficient profit to attract commercial investors. At the same time, without considerable external support the same carbon finance frameworks are virtually inaccessible for small local producers, disempowering them against those that do have the cognitive, technical and financial resources to participate in carbon credit markets.

This has led to further interesting debates on the Energy Access Practitioner Network forum, particularly in response to a new thread stating:

> **Initial post, 26 April 2012:** We are about to roll out 1 million cook stoves in Africa, but need a good reliable and cheap source of these cook stoves, anyone have any ideas? They will be handed out for free, so cheaper the better. (Network Member, 2012)

This post led to an extensive and heated debate, starting politely but showing increasing frustration over time. Extracts are provided below from two different objectors and some of the initial poster's general responses.

> **Objection, 27 April 2012:** I'm a little concerned about your offer of providing 1 million stoves for free. This will disrupt local manufacturers in Africa that produce energy-saving cookstoves, especially if the stoves given are imports, as local manufacturers do not have the capacity yet to produce that amount. Even if you are sourcing from local manufacturers, the market will be disrupted for future sales or other villages that may have heard of the "free" stoves, but did not benefit. […] This type of aid mentality really disrupts entrepreneurship in Africa.

> **Response, 27 April 2012:** Local manufacturers have the same market as we will be entering, if anything they are already there and have access to the same knowledge as we do, if anything more knowledge of the local market etc. […] We will upset the market, but that is the market and the other manufactures will have to adapt to the this new competitor on the block.

> **Response, 29 April 2012:** Hello all, I have been getting some interesting personal posts on development in Africa, they way we see it, is that is it is not some special market, but a potential new market […] We have a business plan that […] will benefit the customer and the environment they live and work in. The small producers will have a bad time, but they have also had enough time to scale up, but not done, we will be big players and employ more than 200 people, provide services and education, but in the end do business.

> **Objection, 4 May 2012:** How is it a "business" model if you give it away for free??? And yes, Africa IS a special case, because not only is the market for cookstoves young, the whole idea of a market is young. […] With cookstoves, where there are only 10s of thousands being sold every year, 1 million free ones completely overwhelms the market. […] and undercuts the new generation of African entrepreneurs trying to make it in private business. If you've raised donations and are looking to make a difference, figure out a way to use it to CREATE a market, not destroy one.

> **Response (to another post), 9 May 2012:** I may have got a bit defensive then, just I have had a load of personal emails as well having a go at me for what we are trying to do and spouting their views our project and I was just a bit frustrated by it all.

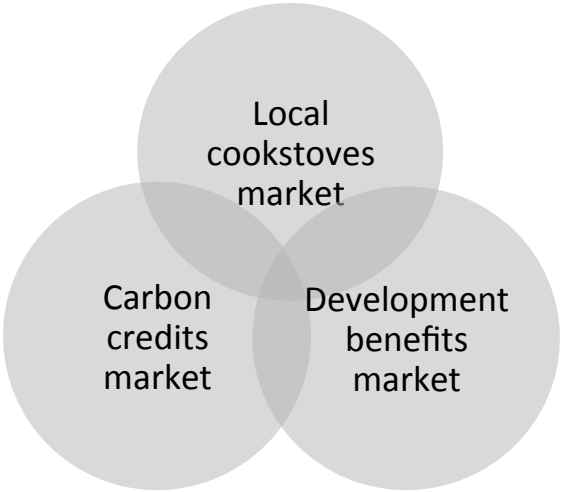
(Network Members, 2012)

This conversation thread illustrates both the extent of personal feelings invoked by a possible threat to marketisation activities for humanitarian good that people are involved in, and the conflicting views that actors with contrasting income-generation priorities can have about what constitutes a successful market project.

Another company, this time a British carbon consultancy, was also developing a large carbon finance project to install 300,000 cookstoves in Kenya at the time of research. There were to be numerous positive impacts such as 65 people employed in Kenya for the project development and use of a Mombasa brickworks to manufacture the non-portable stoves, resulting in their employment of 100 extra staff and significant improvements in health and safety processes. However, the stove that costs around US$45 in materials and labour was to be distributed free to consumers, other than a $2 installation fee. The same company had similar projects in the pipeline for Uganda, Rwanda, Tanzania, Malawi and Ethiopia. Managers from NGOs such as GVEP International and GIZ stated that they this impending large influx of stoves was making them very nervous, however. The response from the carbon finance company in order to achieve maximum efficiency they were aiming for high levels of stove take-up in each area focused on. This meant that they were only working in very poor communities that were still unable to afford high quality portable stoves and therefore no markets for these locally. From a 'development' perspective this made it a highly beneficial project, even if from a marketisation perspective it may be counter-productive to establishing long-term markets.

It is interesting that international frameworks intended to promote low carbon energy markets in developing countries are causing such divisions between people working towards essentially similar objectives: making clean energy products widely available. Even where Ugastove and Up Energy were using carbon finance without such significant subsidies and to support local manufacturing, others actors were still contesting their approaches (Chapter 6). Depending on the particular markets they are involved in (Figure 54) and their prior experiences and expertise, actors can have evidently different priorities and actions.

Figure 54: Actors in cookstove markets may have different priorities depending if they also participate in markets for carbon credits and development benefits



8.8 Marketisation actors replacing the state?

> In their very design, these objects reflect doubts about state capacity to safeguard populations. Rather, they are distinctly humanitarian goods, presenting themselves as an ethical response to failure on the part of states. (Redfield (2012) p.158)

As this quotation shows, it has been argued that humanitarian goods can provide social welfare services in the absence of state ability to do so. Pico-solar products, for example, can replace unavailable or unreliable grid connections where states have failed to ensure adequate services. Similarly, promoting and facilitating poor people to become 'micro-entrepreneurs' has been described as shifting the responsibility for poverty reduction away from the state to individuals themselves, encouraging them to draw on valuable social networks to do so (Elyachar, 2012). Meagher (2005) argues that overly-positive social capital conceptualisations emphasize "the ability of social networks to provide an effective basis for economic development outside the framework of the state" (ibid., p.219).

During this research, the role of the 'state' still emerged at various times as key to marketisation processes. State support was therefore as important even for market-based, instead of state-led, approaches to delivering welfare services. Moving towards a more formal economy requires state entities as actors within the market system. Market devices such as contracts and warranties require an established and enforced legal framework to make them meaningful. Equally standards that cookstove entrepreneurs can engage with as they formalise their activities are put in

place and regulated primarily by national standards boards. When entrepreneurs officially register their businesses, they physically engage with the relevant local government authority, visiting the offices to fill in forms that lead to information about their business being included on government-held databases. The act of formally engaging with state bodies in this way grants the entrepreneurs credibility and recognition and increases the confidence of those that undertake market exchanges with them. All these aspects of state involvement are meant to help protect both buyers and sellers by providing more accurate information about products and formal channels to address any subsequent issues.

When outlining the specific market role of his department in Kenya's growing solar PV market (Interview 30), the Director for Renewable Energy at Kenya's Energy Regulatory Commission (ERC) highlighted that ERC's work is put in statute by the Kenyan Energy Act, the legal instrument which in turn enforces the national Energy Policy, written in a government sessional paper. Both of these documents have emerged and are given meaning by myriad social and technical processes, providing the ERC with agency to perform its specific role as market regulator. How this is done equally emerges from a complex configuration of interacting people, institutions, practices and equipment.

> ERC issues the standards for renewable energy and energy efficiency technologies, in collaboration with KEBS [the Kenyan Bureau of Standards]. We can initiate the process when it seems a standard needs to be created or updated, and then KEBS has the mandate to develop the detailed standard.
>
> ERC develops regulations where needed. If we hear from stakeholders that there's a need then we look to develop regulatory solutions if appropriate. We get regular stakeholder feedback via the Ministry of Energy, then we have meetings with stakeholders to discuss specific issues. […] Like currently there are many solar technicians trained by many people. We can't stop businesses giving training, and don't want to kick them out of business anyway. So we're trying to take everyone's curriculum and work out minimum requirements for someone to become a technician and make it into a recognisable certificate that people will be given a license based on.
>
> It's technical and financial regulation for the benefit of the user and the producer. The aim is that the user gets value for money for whatever service they get offered, including products.
>
> (Energy Regulatory Commission, Interview 30, 2012)

As well as this primary role of helping to protect producers and users of products and services, other less obvious state activities also contribute to marketisation, such as the collection and aggregation of data that other market actors can draw on to gain further agency.

> We are supposed to maintain and collect data on renewable energy and energy efficiency. […[Solar PV, for example, all installers will need to file returns for the number of installations they've done, so this will create an avenue for collating information on totals per year. Currently this information is quite scarce.
>
> We must provide information to the Minister for Energy, for policy and decision-making. We also designate energy consumers – that means, we categorise them into different sections. The main function is to know what type of consumers there are and their characteristics, to help with energy management.
>
> (Energy Regulatory Commission, Interview 30, 2012)

The development intermediaries themselves were also seen to have extensive direct engagement with state bodies. All organisations have to be formally registered in their host countries in the first instance. Often GVEP's initial contact point for recruiting existing energy entrepreneurs was the local office of the Ministry of Energy. As well as supporting enterprises directly in a bottom-up approach, market-making social enterprises and NGOs can take a top-down role of lobbying governments for supportive policies and the appropriate conditions for market devices to work effectively. SunnyMoney's marketisation activities have included lobbying for and then benefitting from the Malawian government's application of import duty relief to imported solar products.

The activities of the state clearly have a significant effect on the activities of other marketisation actors. The Malawian solar tax relief, for example, only applies to complete solar products and not individual parts that can be assembled into solar lighting kits; this was a factor in SolarAid's decision to cease local assembly operations. In September 2013 the Kenyan government removed its VAT relief on solar products altogether, instantly adding 16% to the cost of solar products and removing one of the conditions that had been seen as instrumental in making Kenya's small-scale solar market one of the most developed in Africa. A complaint from a solar company also suggested that Kenyan government actions had curbed their efforts to create local manufacturing capacity. The UK-headquartered company had intended to invest in a regional assembly warehouse in Mombasa to serve whole of East Africa. After buying the land and equipment and building a

warehouse for the sophisticated plant, however, the government had requested that they employ three directors from Kenya, to be approved by the government. This was seen as too costly and unnecessary, and as requests to modify those conditions failed, the plant was established in Egypt to serve the African market from there instead. Even for carbon finance projects, a Letter of Approval is often needed from a designated office of the host country government before the project can be approved under a scheme such as the CDM. One carbon finance project developer stated that they had focused on Kenya and Malawi because it had been straightforward to obtain the approval letter from their government offices. By contrast, it had been very difficult with Tanzania, so this country had been excluded from their projects.

If the state in African countries is not seen to fulfil its role sufficiently, non-state development actors sometimes try to offer additional mechanisms. The IFC/World Bank programme Lighting Africa, for example, has developed a more stringent set of quality standards and its own certification system for solar lighting products being sold in African countries, and collects and shares market data for African pico-solar lighting markets specifically (Lighting Africa, 2013). It is found in parallel to but not in full replacement of state activities, however, since adherence to its standards are voluntary and imported solar lanterns still have to go through the standards tests imposed by national authorities. Micro-entrepreneurs, social enterprises and NGOs were all observed engaging with state bodies and processes to some extent, and accepting this as an inherent requirement of establishing a formal market. Activities in the informal economy, as described by de Soto (2001) and Hart (1973), evolve to operate where state market structures are lacking or inaccessible. Development intermediaries such as GVEP that adopt a brokerage role are supporting informal actors to gain access to formal, state-based frameworks such as standards, and at the same time garner greater understanding of informal market activities and can incorporate this into advocacy work. Rather than enterprise development programmes by-passing a role for the state in development, these examples suggest that they in fact promote engagement with and put demands on state institutions to function effectively.

8.9 Continued gaps in sustainable energy product markets?

It has been shown that different types of marketisation actors have their own advantages and disadvantages in terms of their agency, but several factors have apparently made all actors, whether nominally development or business-oriented,

struggle to make significant progress. Besides the issue of market devices such as warranties discussed above, two such areas were made particularly apparent at various times during the research. These examples and related recent developments are discussed here.

The first is the development of large-scale formal manufacturing capacity. Many pico-solar lighting organisations, including SolarAid, had initially envisaged and often set up some form of local manufacturing, but other than a few limited examples of small-scale assembly, most had resorted to importing lighting products designed in the US, Australia or UK and manufactured in China. For domestic-scale lighting this continues to be the dominant model, although excitingly Africa's first large-scale solar module manufacturing units have now been established in Ghana and Kenya and undertake all processes except fabrication of individual solar cells. The Kenyan factory in Naivasha has been established by a Dutch and Kenyan consortium and received co-financing from a Dutch Government fund to support renewable energy projects in developing countries (Ubbink East Africa Ltd, 2013). This provides another interesting example of an international business and development partnership.

For cookstoves, there is a much greater prevalence of domestic manufacturing capacity, with many enterprise development programmes such as DEEP having focused on this. It still tends to be artisanal production, however, with a clear difference between the products produced as shown in the photos below. The left hand photo shows one of the higher quality stove brands produced in Kenya, by a co-operative of women called Keyo who were DEEP entrepreneurs and are now partners. The right hand photo shows a US-designed, Chinese-manufactured Envirofit stove that is imported to Kenya as a competitor. There are obviously still huge differences, but these are also reflected in the cost to make each. As long as these costs are reflected in the retail prices offered to end-users, the locally made products can still compete, but again highlights the possible implications of marketisation actors significantly subsidising prices.

Photo 55: Keyo cookstove (left); Envirofit cookstove (right) (Envirofit International, 2013)

The second issue often raised is that of consumer finance. In order to fulfil their conceptualisation, it is argued that humanitarian goods should be available to the poorest. Micro-credit, for example, has been criticised for rarely achieving this (Cull et al., 2007). Although the sustainable energy products described here are specifically designed for the 'BOP', their sales prices can still be inaccessible to those with very limited financial resources. Besides the subsidy approaches discussed above, various solutions have been tried, such as provision of products on time-based payments. Most large-scale sellers of products find offering such arrangements unsustainable, however, so often leave it for micro-entrepreneurs to offer credit to their own customers at their own risk if wished. Customers can also engage with more formal channels of product-based credit provided by local microfinance organisations. The first option can put stress on the social relationships of local entrepreneurs, something elucidated in Dolan and Scott's (2009) study of South African women selling Avon cosmetics. The latter approach tends to result in elevated product prices over time. A microfinance organisation in a remote area of coastal Kenya was found to be selling a solar lantern for 6,600 Kenyan shillings over 12 months once the organisation's mark up and 20% annual interest was incorporated. By comparison, in larger towns it could be found retailing at around 4,500 Kenyan shillings. On the upside, however, it was making the lanterns geographically and financially available to low-income rural customers and made it simpler (on the customer side at least) for the one-year warranty to be utilised if necessary.

Technical solutions to consumer finance limitations have recently started being explored, with pay-as-you go systems paid for with an initial deposit and incorporating mobile phone technology that uses locally bought SIM cards to unlock the products weekly. A system designed by the British company Eight19 was piloted by a SunnyMoney entrepreneur in Malawi. Although various difficulties were encountered with the prototype, the product seemed to offer a promising solution that links apparently isolated solar kits into the global communication network created by mobile phone companies and their technologies. Since the same kits can be used to charge mobile phone batteries, it creates a neatly symbiotic relationship where each product relies on the function of the other to fulfil its own purpose. It will be interesting to observe the marketisation processes around these products as they continue to be developed over time.

Photo 56: Eight19 'Indigo' pay-as-you-go solar lighting kit packaging and a pilot customer buying an Indigo scratch card from a SunnyMoney entrepreneur in Malawi

8.10 Summary of findings

This chapter has put development intermediaries and other market-making actors at the centre of the analysis in order to address the fourth research question:

> How are marketisation approaches integrated into the development apparatus?

The main findings presented in the discussion are summarised below.

Parallel participation in development benefit markets

Organisations tied to donors or socially-conscious investors are also participating in markets for 'development-relevant benefits' that, following standard market principles, inevitably require service providers to compete against each other. Organisations interested in 'development' are not special cases, external to market

processes – even if they are sometimes expected to be. Intermediaries will prioritise delivery of different types of development-relevant benefits based on both their own relative valuation processes and the power exerted by donors and other stakeholders. The motivations of individuals within a development intermediary may not always be fully aligned with organisational goals, however. As for other organisations, development intermediaries are simply configurations of people, practices and equipment with their own actions and abilities, and continuous, complex interactions between them. For example, it has been shown that the emergence of strong social bonds between people on either side of the intermediary/supported local actor boundary can ultimately influence the strategic directions taken.

For an intermediary to compete effectively, development benefits can be qualified, quantified, valued and priced like any other product or service being converted into an exchangeable good. The aggregated data also becomes a key tool in its own right, allowing the organisation to view its impacts and make necessary changes. However, the 'facts' generated can never be entirely independent of the social and technical processes of their generation. The ability to collect and transfer data depends on availability of measurement tools and sales records, for example, and information is always passed on with a perception of what it might be used for, whether or not that consciously affects the process. These factors are not often acknowledged outside of NGOs and social enterprises that are generating data, but the 'black box' often put around the creation of stabilised development data by monitoring and evaluation (M&E) departments has been partially opened here.

The assumptions applied to aggregated data can significantly impact how a project is portrayed, for example. A particular area where numerous assumptions are relied upon is in the assimilation of fixed monetary donations leading to specific outcomes. Buyers of development-related benefits (donors) are often perceived to have a need to see their donation as a simple market exchange process, '£x = x people helped', despite the complex non-linear processes that they are in fact supporting. Inevitably M&E systems are also primarily established to monitor only the beneficial impacts of development projects. A donation of '£x' might also '= difficulties for x people', albeit indirectly and unintentionally, yet the data and its presentation keeps these side-effects outside of the lens. The case study organisations are making some efforts to monitor unintended negative impacts, but monitoring systems necessarily fix specific boundaries in order to be implementable within the available budget. Replacement of linear logical frameworks with 'theories of change' as a basis for

modelling development impacts may help to promote the capture of diverse and unexpected impacts over time.

From development to markets

Since both case studies are of market-based approaches, the underlying discourses of both nominally 'development' organisations perhaps unsurprisingly demonstrate a concerted shift towards economic language instead of development rhetoric. In fact, it could be argued that labelling them in this thesis as 'development intermediaries' could be falsely reinforcing their connectedness to international development theory and practice. The continued dependence on the existence of various forms of development-related funding does impose various constraints, such as the need to present the energy products as 'humanitarian goods', but in general the influence of economic tools and discourses are becoming evident. It could also be supporting a move away from much-critiqued development dualisms and the construction of charity-dependent 'developing' countries that has been maligned by post-development writers. The move towards markets does present some practical challenges, such as staff trained in and motivated by social needs being asked to adopt business principles, but these appear to be surmountable.

The reliance on economic practices developed in western contexts does have dangers, however, such as a possible tendency to neglect locally developed market tools. As discussed in the previous chapter, another significant issue is the imposition of market devices of such complexity that power asymmetries are created between those who can (generally international macro-actors) and those who cannot (local micro-actors) access them.

Varied organisation types

Broadening out, different types of macro-actors have particular advantages and disadvantages in marketisation processes due to their often fuzzily defined legal structures and varying levels of attachment to socially conscious stakeholders. Traditional non-profit development intermediaries such as NGOs have both restrictions (i.e., all activities must be framed as 'development' relevant) and freedoms (i.e., activities do not have to generate an income) from the use of charitable funding. The 'brokerage' activities of DEEP have shown how the end of funding packages does not need to mean a collapse of integral market infrastructure when marketisation activities by NGOs are ceased.

Mainstream businesses have much greater autonomy provided that there is a promise of profitability. However, there are particular risks caused by the power imbalances between large-scale product distributors and low income, low resilience 'BOP' consumers that might be insufficiently protected by incomplete or inaccessible market devices. Social enterprises and business-development actor partnerships may offer some hybrid solutions, including greater accountability to end-users and regulatory checks that their activities are socially responsible. For the pico-solar market in Malawi, the social enterprise approach of SunnyMoney, whereby they have taken an integral role in the market as importers and distributors, is so far achieving high sales volumes. Their successful schools programme can be seen rapidly catalysing demand in new market areas. As SunnyMoney is intended to be a long-term market participant, not merely leaving after a fixed funding period is over, there are some crucial factors to consider for sustaining this business growth. In particular, trust in the products and brand must be maintained, making it vital for after-sales services to be made available through locally appropriate market devices.

In addition to providing an insight into marketisation processes, this ethnographic analysis of two British development intermediaries challenges some older portrayals of international development organisations. Rather than all being highly paid expatriates, GVEP and SolarAid staff were primarily national citizens and, at least to some extent, had the autonomy and opportunity to shape the organisations' activities. There were still some differing employment conditions for staff in the African offices compared to the UK, but these could be attributed to country-specific practices and long-term funding uncertainties.

Further considerations for successful marketisation

Such different types of market actors competing in new markets for humanitarian goods can cause more complex issues of competition than might be seen for other commodities. Although it is now commonly accepted that free distribution is not conducive to long-term marketisation, subsidies are still common, particularly as clean energy products allow their distributors to also participate in carbon credit markets. In some cases the different priorities of competing actors is creating new tensions. Another important marketisation process is therefore the creation of communication channels between them. It also again reinforces the need for all market actors, local or international, to have access to the same subsidy-generating market devices.

The examples of efforts to create energy product markets in African countries has also shown the necessary role of the state in marketisation processes, particularly in completing the configurations needed for market devices such as product standard systems to function. Contrary to arguments that market-based approaches by-pass a role for the state in development, the examples observed here found that they in fact promoted engagement with state bodies and processes through their encouragement of formalised activities, and exert pressure on state institutions to fulfil their roles effectively.

Finally, the facilitation of domestic manufacturing capacity and overcoming consumer finance issues have been seen as particularly difficult areas for actors in African domestic-scale sustainable energy product markets to make progress in. Recent new developments suggest that they will make interesting future case studies for marketisation research in this field.

9 Conclusions

This thesis is written at a time when recognition of anthropogenic climate change is stimulating interest in finding 'low carbon' solutions to the lack of energy access in sub-Saharan Africa and other 'less economically developed' regions. Parallel to this there is an increasingly blurred line between development, social enterprise and business actors looking to see people at the 'bottom of the economic pyramid' (BOP) as distributors and consumers, and to a more limited extent manufacturers, of goods that can help meet their lifestyle needs and desires.

Ethnographic methods have been used, primarily participant observation inside two case study organisations, to explore the market-based approaches being used by broadly defined 'development intermediaries' to create and expand markets for domestic-scale clean energy products in rural areas of sub-Saharan Africa. The research has focused on the distribution and in some cases local manufacturing of clean cookstoves, biomass briquettes, solar phone charging services and pico-solar products in Kenya, Uganda and Malawi. The market activities under analysis have been presented through four generalised and simplified market maps.

Using primarily the work of Çalışkan and Callon (2010), the markets have then been conceptualised as socio-technical assemblages. This has demonstrated the full extent and complexity of such markets and the marketisation processes that create them. It soon then becomes apparent that this would be impossible to represent on simplistic, stabilised schematics. The notion of a socio-technical assemblage draws on economic sociology, science and technology studies and actor-network theory; it highlights the technical aspects of markets and their components, and that networks of humans and non-humans constitute marketisation actors that perform markets around specific products. This conceptualisation has generated new findings and allowed the thesis to respond to Çalışkan and Callon's call for research into the intricacies of marketisation processes in varied contexts.

The following discussion summarises those findings, splitting them into four main categories by theme: power asymmetries created by unequal access to complex market devices; processes, problems and benefits of 'engendering of economic subjectivities' through entrepreneur recruitment and training; implications of overall shifts from development to market-related rhetoric and theory, and; the need to promote domestic manufacturing in order to redress value sharing across supply chains. An overview of some of the limitations of the research is then provided, followed by suggestions of related future research.

9.1 Market devices, macro-actors and power asymmetries

As the international development community, carbon finance stakeholders, international and local businesses and end-users all engage with sustainable energy technologies for different reasons, the energy products considered here become evidently multi-faceted: 'humanitarian goods' or 'life technologies' (Redfield, 2012); 'low carbon' technologies that generate carbon credits; income-generation opportunities; useful light generating, phone charging and cooking means. Once these products are valued by different people or groups of people, they become open to market exchange.

Callon et al. (2007) find that the actual tools and systems that allow markets to function are often overlooked in social science studies. They term "the material and discursive assemblages that intervene in the construction of markets" (ibid., p.2) as 'market devices,' similar to Foucault's 'dispositifs' (often translated as 'apparatus') but with physical artefacts and tools incorporated. Market devices help shape the ways in which people and products interact in a market, for example shaping the processes of qualification[31] and price setting. This research has identified various market devices that appear to play an important role in the case study sustainable energy product markets. These are listed below.

- **Quality assurance schemes (standards):** For individual buyers the significance of adherence to quality standards is unclear, but successful engagement with these complex systems of testing equipment, facilities and skills, standards specifications, certification bodies and so on, can lead to more than important-sounding statements on marketing material. It has been shown that various macro-actors such as solar lantern importers/distributors (e.g. SunnyMoney) and cookstove distributors (e.g. supermarkets) choose to engage only with products that come with a quality mark attached. Being able to access these market devices can therefore contribute significantly to manufacturers' agency.
- **Warranty systems:** Small warranty cards are found in the boxes of many energy products that are imported into sub-Saharan African countries. These market devices only function, however, when the full necessary social and technical arrangements are in place. Even lack of a paper receipt to demonstrate the purchase date can jeopardise this. Lack of familiarity with the warranty concept, limited physical means to pass faulty products back along geographically extensive supply

[31] Qualification: whereby the list of qualities attached to goods are repeatedly "attributed, stabilized, objectified and arranged" (Callon (2002) p.199)

chains, and no in-country presence of manufacturers were also found to be missing components for solar lantern warranties in Malawi.

- **Carbon market mechanisms:** Complex systems have been devised to allow sustainable energy products to generate 'carbon credits' that can be sold in their own market. However, actors must have access to specific cognitive, financial and technical resources in order to engage with these market devices and extract that additional value.
- **Patenting frameworks:** This is another example of market devices that can lead to increased agency, and thus power, for those actors that can access these formal, expensive and complex market devices. The 'informal economy' does offer opportunities for usurping that power to some extent, however, through lack of regulation.

Çalışkan (2010) conceptualises global cotton markets as 'fields of power' due to the power asymmetries seen in the relationships between farmers, local merchants and global traders. He shows that cotton farmers are marginalised by their limited access to knowledge of wider market activities and exclusion from the market devices deployed by traders, such as 'prosthetic' pricing models. Similarly in these case studies, differential availability of and access to the full assemblages that make up market devices results in the creation of 'macro-actors' and subsequent power asymmetries. Local 'consumers' are made to pay for the theoretical value of warranty cards supplied with solar lanterns, despite having no history of such market devices nor the physical means to extract that value from them. Local artisans making efficient cookstoves are competing with foreign organisations that have the capacity to interact with the 'black boxes' of carbon market mechanisms and thus benefit from a value source that is left invisible to most.

Links to dependency theory

These market devices are all based on a history of economic thought and concepts that have developed in, and through study of, specific western market contexts. Notions such as 'quality assurance,' 'consumer protection,' 'warranty period,' 'carbon credit methodology' and 'international patent' have not emerged from sub-Saharan African countries, yet many of them have become applicable here through the globalisation of market activities. Çalışkan and Callon (2010) stress the importance of considering the role of 'economics at large' in analyses of marketisation, including both academic economics and "the array of knowledges and the know-how on markets that non-academic agents elaborate and employ" (ibid., p.4).

The domination of western economic tools in marketisation processes in African 'developing country' contexts is to some extent reminiscent of dependency theories.[32] These emerged between the 1950s and 1970s to challenge modernisation theory and the notion that free international trade, without protectionist policies, benefits all countries. Dependency theorists such as Baran (1957) and Cardoso (Cardoso and Faletto, 1979) conceptualised countries into central and periphery, and suggested that central countries would always manoeuvre to ensure their continued dominance. Similarly, market devices nominally developed to bring added revenue streams to low carbon energy services in developing country contexts have seemingly resulted in further dependency on international macro-actors, due to their reliance on complex economic 'mechanisms' that require cognitive, financial and technical resources to access. They thus appear to create greater power and income opportunities not for developing country actors, but for international consultancies and businesses with these resources more readily available.

As Callon and Latour (1981) suggest, being able to generate modes of thought and complex processes and then pack them away into black boxes, out of reach and beyond challenge for others, renders entities into 'macro-actors'. If markets for humanitarian goods predominantly involve design, manufacturing and managing distribution processes externally to the intended domestic context of their use, the 'value-sharing' of these products is always going to be significantly in favour of such macro-actors.

Maintaining trust or vulnerable consumers left exposed

For the pico-solar market in Malawi, the social enterprise approach of SunnyMoney whereby they have taken an integral role in the market as importers and distributors with accompanied innovative marketing activities, is so far achieving high sales volumes. Ensuring that trust is maintained in both the products and SunnyMoney as a market actor will be crucial for sustaining business growth, yet inaccessibility of the warranty market device currently jeopardises this. It also leads vulnerable 'BOP' consumers exposed, reliant on the good nature of 'socially conscious' businesses. If mainstream businesses without such specific social mandates are going to be encouraged to engage with this consumer group, as advocated by Prahalad (2010) and others, there is clearly a need to ensure that systems designed to protect consumers do work in the contexts they are placed in.

[32] Dependency theory emerged as a response to modernisation theory (that suggested all countries would move through a similar pattern of development.) It highlighted that late-developing countries were now in a different context, marked by the emergence of a global economy, and drew attention to the limited opportunities for economic gain available to countries dependent on the export of raw materials (Payne & Phillips, 2010).

De Soto (2001) suggests that capitalist systems are failing in developing countries partly because of the inaccessibility of legal frameworks for formally registering assets such as businesses and property, leading to large amounts of 'dead capital' and an 'undercapitalized sector'. 'Legal' and 'extralegal' are the alternative terms given for formal and informal economies. It is therefore perhaps no surprise that formal market devices like warranty systems can be very difficult to implement. Even if they are offered, if a manufacturer or distributor does not follow up on the promises made, a consumer that is unable to access the relevant legal frameworks has limited agency for redress.

Equitable, locally appropriate market devices and brokerage services

The 'informal economy' can find its own solutions to some of these issues, such as using patents in the knowledge that it will not be noticed or anything done about it, but when macro-actors can attach greater value to their products out of access to market devices, power asymmetries become pronounced. Evidently the ideal situation would be to avoid this in the first instance, and within ongoing work to find appropriate channels for 'low carbon funding' priority must be given to creating equitable access. Where this is not the case, such as with existing carbon finance mechanisms, this research has illustrated some of the 'brokerage' services that non-profit organisations can provide. Impact Carbon's work with Ugastove is one example; Uganda Carbon Bureau's work to aggregate small cookstove projects is another.

It should also be ensured that market devices are locally appropriate. This is not to say that a warranty system cannot be utilised; Barefoot Power's system of direct sales people and local service centres in Uganda appears to provide the necessary socio-technical components to turn warranty cards into tools that most consumers *can* extract value from. However, this is certainly not the case in Malawi, and potentially not in other countries where Barefoot does not operate directly, or for solar lanterns manufactured by other companies. In these contexts there appears to be potential for finding more locally appropriate solutions. Perhaps this will only happen if the starting point is consideration of the local context instead of trying to import ready-made market devices reliant on western, formal modes of operation.

There is also evidently a role for the state, particularly in completing the configurations needed for market devices such as product standard systems to function. Contrary to arguments that market-based approaches by-pass a role for the state in development, the examples observed here in fact promote engagement

with state bodies and processes through their encouragement of formalised activities, and simultaneously exert pressure on state institutions to fulfil their roles effectively.

9.2 Engendering economic subjectivities and performance of market roles

Market maps have been used present how the development intermediaries are undertaking marketisation activities and highlight some of the other key actors involved, following Çalışkan and Callon's (2010) recommendation that studies of marketisation cases should start by identifying relevant stakeholders. Latour's (1987) writings highlight, however, that this type of simplification involves depicting the market system as a 'cold' stable object. While the market maps are useful to provide a visual overview of the case studies, it should be acknowledged that the constituent elements of this stabilised conceptualisation only exist through continually being produced and performed. Markets are not fixed, specific entities but are created out of collective performance of different market roles and adherence to sets of tacit rules and practices.

As international development has turned to new market-based approaches, the notion of 'entrepreneurship' has become particularly popular and often seen as a panacea for both the creation of livelihood opportunities and getting 'humanitarian goods' to people that are perceived to be able to benefit from them. A focus on the systems of entrepreneur recruitment, training and ongoing support in the case studies and other interviewed organisations show varied approaches. Analysis suggests that it is not possible to determine which individuals will best 'perform' a market role in the specific way envisaged by the development intermediaries; many 'successes' were seen with no obvious determining factors for success, and equally those with potential market agency often focused on other activities not related to energy products.

To reduce the risks of low apparent success rates, it appears that increasingly development intermediaries are pre-selecting those who already have more financial, material, social and/or cognitive agency, arguably representing a shift away from true 'BOP' entrepreneurs. Since getting energy products to end-users is the 'development benefit' being prioritised this is not necessarily problematic, however, and can also be defended by 'trickle-down' arguments. Inevitably entrepreneur recruitment and selection will never be entirely systematic in any case,

always emerging from existing networks, encounters and perceptions. From a practical point of view, selection and training approaches may be an area for more discussion and learning between development intermediaries, although this will require navigation around competitive relationships between them.

Processes of economisation

The main components of the entrepreneurs' agency to perform their market roles are: their application of 'economic' tools; their technical capacity and the physical tools and facilities required, and; their interconnectedness through the networks they are part of. Their 'conversion' into energy product market actors starts with their adoption of the 'economic' language and actions of business people. It is argued that even a simple shift in the language used by the development intermediaries supporting them, from conceptualising them as development 'beneficiaries' to labelling and treating them as 'entrepreneurs', has a performative role. For this reason, it is proposed that entrepreneurship is a 'discursive device' for marketisation.

The one-to-one relationships at the intermediary-entrepreneur interface are found to be key in facilitating the discursive device and building on it further, particularly under GVEP's DEEP where the relationships developed between entrepreneurs and their mentors appear to be a vital component of success of the programme. Careful recruitment of the mentors is therefore as important or even more so than selecting the trainee entrepreneurs. The purpose of the training and ongoing support activities can partly be framed as helping the entrepreneurs move from informal to formal economic practices. Given the lack of trust found by most entrepreneurs in their customers repaying them if they were to sell products on credit, it suggests that most have already left behind some of the reliance on 'social contracts' that characterises the informal economy (de Soto, 2001). Without full access to formalised frameworks, however, it is perhaps most appropriate to move away from a stark divide between formal and informal to see it as a progressive continuum.

Engendering economic subjectivities: problematic?

Although 'entrepreneurs' may increase their discursive, cognitive, and physical tools of business, it is not to say that they are initially passive, featureless actors then subjectified by the marketisation processes of the development intermediaries. Instead each builds on their existing agency to make their market performance unique. Their skills, networks, ideas, tools and facilities most likely become

involved too, if desired by the entrepreneurs, but this has been open to critique by some scholars. Elyachar (2005), for example, criticises the transformation of relationships into economic assets. Caution is certainly necessary where personal resources are vulnerable to misuse. If people with limited financial resilience are encouraged to dedicate all of their time to making a product that turns out not to be valued by potential end-users, or to spend a significant proportion of their financial resources to buy a product that breaks without opportunity for redress, that is problematic. This becomes even more so if they are encouraged into formal debt to do so.

Promoting indebtedness as a means to achieving poverty reduction is part of a much wider debate, however, that is particularly explored in analyses of microfinance approaches. During this research, DEEP entrepreneurs were seen to be carefully selected for loan recommendations. Most of those put forward had then apparently benefited from the loan and coped with the repayment systems. However, a few had amassed debts or appeared to be confused at the conditions. Perhaps more flexibility to allow organically developed, local solutions could again be the answer; the desire to move entrepreneurs towards formalised arrangements may possibly encourage reliance on formal conceptions of 'access to finance' with limited exploration of alternative options.

In terms of loans and more generally, in these case studies there appears to be limited forced requirement placed on the entrepreneurs and dealers; many DEEP entrepreneurs continue to do other activities part-time and never fully become energy entrepreneurs in order to have a safety net, while SunnyMoney entrepreneurs use their personal networks to set up sub-dealer systems without any provocation or training. Furthermore, the development intermediaries undertake various activities to take the market actors they support beyond the boundaries of existing connections, increasing their agency in economic and possibly non-economic ways. Facilitation of co-operative working arrangements, for example, can be seen to lift actors from 'micro' towards 'macro' and empower them accordingly. Overall, therefore, it is argued that the development intermediaries focused on here are not engendering economic subjectivities alone, and the 'brokerage' process can equally augment the social and technical resources of the individuals involved, providing access to new techniques and filling 'structural holes' between people or groups. Furthermore, as the 'entrepreneurs' become endowed with the necessary market tools, they become marketisation actors themselves as they perform their intended roles.

9.3 Development → markets

It is also suggested here that the subjectification of market actors is preferable to engendering charity-dependent beneficiaries. The underlying discourses of both nominally 'development' intermediaries that formed the case studies perhaps unsurprisingly demonstrate a concerted shift towards economics and away from development rhetoric. This is a positive step in terms of its response to the arguments of post-development actors, for example tackling 'developer'-'beneficiary' dualisms and the social construction of impoverished 'developing' countries.

Market-based approaches give the opportunity for people to choose to engage through market processes rather than simply being recipients of hand-outs. The meanings and values that people ascribe to objects are at the centre of rendering them into exchangeable products. Market exchange models of distribution therefore create a feedback system whereby the destined consumers must sufficiently value the products in order to buy them. Through the decision of whether or not to actively engage in market exchange they thus become inadvertent participants in the shaping of these products. For example, it is recognised that renewable energy is not always the best solution to meet rural energy needs, yet 'low carbon' solutions have sometimes previously been imposed on communities due to the influence of the climate change agenda. Much of the research in this field to date has focussed on case studies that justify sustainable energy technologies as effective rural energy solutions. Leaving this to purchasing decisions allows self-selection of the end-users instead of external prescription of technological solutions.

The case studies also show a perhaps unexpected strength of relationship between 'developers', now marketisation actors, and those previously referred to as 'beneficiaries', leading to blurred or crossed boundaries in various cases. Even the apparent 'developers' are mostly local actors too, as this is seen as key for giving them appropriate support and understanding local market contexts. Reliance on economic theory developed in western contexts is likely to have as many dangers as adherence to development discourses, however, such as the market device issues discussed above, so it is in no way proposed as a panacea to solving global inequalities.

Market actors or development actors?

The 'brokerage' activities of DEEP have shown how the end of funding packages do not need to cause a collapse of integral market infrastructure when NGOs activities are ceased. However, the continued dependence on the existence of various forms of development-related funding does impose various constraints, such as the need to present the energy products as 'humanitarian goods'. It stops the target groups for cookstoves and solar lanterns from moving away completely from beneficiary status, not quite yet reaching the modern consumer image that market-based approaches apparently strive for. It also might restrict the opportunities for 'social enterprises' linked to development stakeholders: can solar-powered televisions, for example, fit into the required 'life technology' conceptualisation? It will be interesting to see the direction that development-related actors in this field continue to move in. GVEP, for example, is seemingly making headway in its new programmes to detach from a development fixation with small enterprises.

The move from development to marketisation actor does present some practical challenges, such as staff trained in and motivated by social needs being asked to adopt business principles. The fairly recent engagement of traditional development intermediaries with core 'business' skills such as marketing techniques is sometimes evident and there perhaps remains a further transition to be made.

Although attachment to development-related donors and investors imposes restrictions, it also provides some safeguards in terms of reporting requirements, something that seems particularly necessary when advocating targeting of this vulnerable consumer group. For-profit approaches have the in-built feedback mechanism of whether consumers choose to participate in market exchanges or not, but where this fails it will leave new BOP entrepreneurs hardest hit. The power imbalances between large-scale product distributors and low income, low resilience 'BOP' end-users are more accentuated where consumer protection market devices are incomplete or inaccessible, as discussed above.

Based on Abu-Saifan's (2012) entrepreneurship spectrum (Figure 5 in Chapter 0) social enterprises can be non-profits with earned income strategies or for-profits with social missions. Both approaches may offer greater accountability to end-users since checks that their activities are socially responsible are required, with the caveat that positive framing and some data bias of monitoring activities is hard to avoid. Where international actors are engaging in BOP markets in earned income or for-

profit ways, therefore, increased promotion of social enterprise models and enhancing the related regulatory frameworks for them appears a positive step.

This research has presented some successes in marketisation activities, but it has also shown that tensions between actors exist where priorities or approaches differ and have the potential to undermine each other. The diversity of actors competing in markets for sustainable energy products appears to lead to more complex issues of competition than might be seen for other commodities. Although it is now commonly accepted that free distribution is not conducive to long-term marketisation, subsidies are still common, particularly as clean energy products allow their distributors to also participate in the market for carbon credits. This further reinforces the need for all market actors, local or international, to have access to the same subsidy-generating market devices.

This research has provided a detailed ethnography 'inside' two British development intermediaries that are prominent in the sustainable energy sector. It provides an update to some earlier examples of this (e.g. Crewe and Harrison, 1998) and challenges some of the older conceptualisations. Although white four-wheel-drive vehicles were still sometimes used, staff such as GVEP's business mentors and SunnyMoney's sales teams were generally hard to distinguish from any other Kenyans, Ugandans or Malawians undertaking their daily business activities. The offices were not full of highly paid expatriates; on the contrary, all in-country managers and directors were national citizens. Both organisations still had UK headquarters with oversight across all of the country offices, but this seems inevitable given that donor funding and product purchases (for SunnyMoney) are channelled through the UK. It is also something that is unlikely to change soon, since moving away from traditional international development models towards humanitarian goods markets seems to be promoting international, not African, products.

9.4 Next steps: domestic manufacturing and further innovation

Although job creation is not specifically the central focus here, local manufacturing of cookstoves leads more easily to locally appropriate innovation, due to greater access to end-user feedback and knowledge of local resource availability. This can all be done without needing to engage in the complex feed trials and laboratory tests developed by international actors. Even simple standardisation tools such as

specifically-sized cookstove liner moulds have been significant for local marketisation of particular cookstove designs by facilitating disaggregated manufacturing. Although it has taken significant time and funding by development intermediaries to reach this point, lessons learnt in the impacts that these seemingly peripheral market activities can have might allow optimism for more efficiency in future approaches.

More technically complex products such as solar lanterns require engagement with a greater array of market devices, however. These ensure high quality, standardised products that come with detailed evaluative information such as 'brightness in lumens', but the extensive socio-technical configurations required for such qualification processes show why locally-made products can struggle to compete. This is why new solar assembly production facilities in African countries are very exciting. Not only will it increase local skills and reduce product prices, but it will also require related resources such as testing laboratories to be developed. Ultimately 'win-win' contexts of energy products being locally manufactured *and* distributed *and* used will be the manifestation of diminished power asymmetries between market actors.

That is not to say that the role of socially and environmentally conscious organisations will soon be defunct. Even in the unlikely event that such market equality is achieved or its desirability even acknowledged, there will always be room for further innovation. For example, one of the key components of the humanitarian goods conceptualisation is that the goods should be accessible to the poorest; this reinforces the need for tackling consumer finance barriers.

9.5 Limitations

It is acknowledge that this research has various limitations that result from its chosen boundaries and the methodological approach used. For methodological limitations, ethnographic methods that use the researcher as the 'research tool' will always be influenced by the subjectivity of that researcher. I endeavoured to undertake the data collection and analysis as objectively as possible, but inevitably both the observations made and the interpretation of those observations will have been affected by my own background and values. This has been considered as far as possible within the 'reflexivity' section of Chapter 0, but ultimately this is my ethnography rather than a perfectly objective work. The methodology chosen also sets the boundaries of the research in terms of number of case studies, chosen case studies, length of participant observation period, and so on. Again the decisions

made have been explained in Chapter 4 and the subsequent limitations referred to where necessary within the thesis.

In terms of the analytical boundaries, some of the key notions that this thesis refers to have not been fully challenged here. In particular, 'development' and 'market' have been accepted as utilised terms whose related activities have been explored, by considering how operations can and do occur within these prevalent systems. The question of whether such systems are fundamentally appropriate within society or not has not been posed, however. For example, capitalism as a mode of societal organisation and the very existence of 'international development' organisations have not been critiqued. This lack of challenge might be argued by some as reinforcing prevailing patterns. It also means that the conclusions do not push for any radical paradigm shift or promote alternative ideologies. However, some of the specific nuances of 'market-based' approaches have been challenged, such as reliance on western economic models and related dominance of international market actors, and some 'softer' capitalist models such as social enterprises and co-operative working have been explored. Similarly, the arguments of post-development writers around the detrimental conceptualisations of 'developing' countries that development activities can reinforce have been acknowledged and integrated into the analysis where possible.

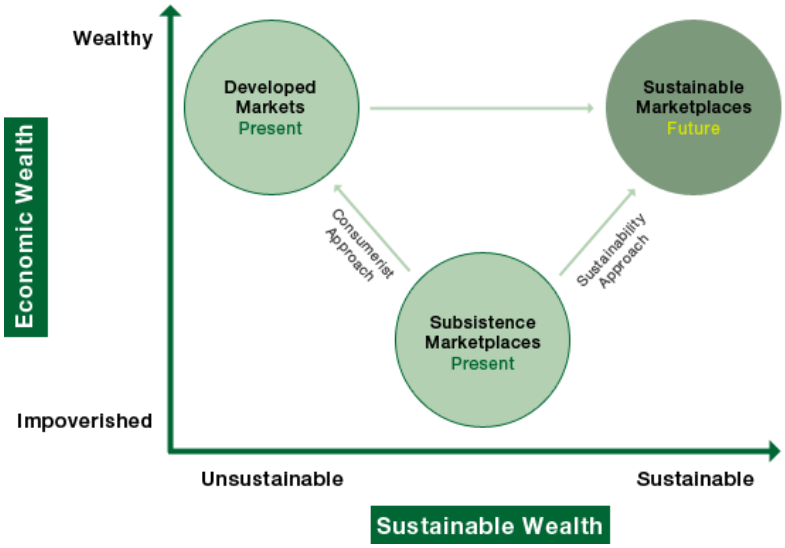
Since one of the key drivers behind the design and distribution of sustainable energy products is environmental concerns, one area that does perhaps require further challenge is the sustainability of turning relatively low consumption people at the BOP into consumers. Dolan (2012) brings attention to this in broader BOP approaches noting: "the effects of selling single-serve sachets of soap and shampoo in a context of global climate change" (ibid., p.3). Similarly Viswanathan and Sridharan (2009) suggest that:

> […] perhaps most importantly, market engagement with the poor has to be achieved in socially, economically, and ecologically sustainable ways; thus, the challenge of sustainability must be squarely addressed. Progress through merely mimicking consumption behaviors of those at higher levels of the income pyramid represents a drastic threat to the already unsustainable conditions on the planet. (ibid., p.1)

They conceptualise this as using business approaches to turn 'subsistence marketplaces' into 'sustainable marketplaces', as summarised schematically in Figure 55. Clearly the purposeful design of 'sustainable' energy products can be argued to inherently adhere to a sustainable marketplaces future. However, further consideration needs to be given to sustainable manufacturing processes, material

use and disposal. Battery use within pico-solar products is of particular concern, for example.

Figure 55: From Subsistence Marketplaces To Sustainable [33] Marketplaces (Viswanathan and Sridharan, 2009)



9.6 Suggestions for further research

Approaches that incorporate environmental sustainability more concretely into the manufacturing and distribution of clean energy products could therefore be argued as an area for further research. Ways of facilitating domestic manufacturing capacity and overcoming consumer finance barriers have already been highlighted as interesting future case studies for marketisation research in this field. This thesis has also highlighted some areas where marketisation actors may benefit from more detailed understanding. Different reasons for valuation between development-stakeholders and end-users are clearly perceived, but further research might explore the accuracy of some of these perceptions; environmental benefits may be more valued by potential customers than assumed, for example. Establishing and obtaining quality standards has also been seen to be a focus for development intermediaries involved in markets for humanitarian goods. However, what do quality standards mean to end-users in these rural African contexts? Do they value them and does it affect their purchase decisions?

More specifically, expanding the research undertaken here into longitudinal research could offer much deeper insights into the longer-term impacts of market-

[33] Viswanathan and Sridharan (2009) note that sustainability is used in the broadest sense of the word to capture social and ecological in addition to economic aspects.

based approaches. GVEP International's DEEP has now finished and unless the entrepreneurs have passed into its successor programme, their involvement with GVEP has finished. The longevity of the positive impacts of DEEP on its entrepreneurs beyond the project timeframe was a particular concern for their business mentors. Revisiting some of the entrepreneurs post-DEEP could provide some valuable insights into this, and generally allow more extensive analysis of the processes and impacts of their rendering into 'economic' actors. It is partly for this reason that the names of the entrepreneurs engaged with have been left in this thesis. Similarly, a future revisit to SolarAid's SunnyMoney operations to observe its progress and any further shifts in approach would generate a valuable longitudinal analysis. Increasing access to sustainable energy goods and services is a long-term process, and understanding it more fully will require longitudinal research.

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Appendix A: Methodological discussion

The following discussion describes how the number of cases was chosen and the process of case selection, followed by an introduction to ethnographic methods and participant observation in particular.

Number of cases

Using ethnographic methods limits the number of case studies that can be focussed on and thus influenced the decision to select just two cases. Case study research has frequently been criticised or held in low regard due to inevitably involving a 'low-n' research design. Maximising the number of cases can certainly help to increase the likelihood of generalisability (Gerring, 2004). However, since generalisability is not the aim here, 'low-n' should not be seen as a limiting factor but as inevitable, and mitigated through the richness of an ethnographic approach.

Equally, it can be argued that focussing on just one case would provide a deeper and more revealing ethnography. It is frequently documented that ethnographic research requires a large time investment in order to produce a representative analysis. DeWalt and DeWalt (2002) cite the example of witchcraft: where reports of witchcraft have been documented by ethnographers studying particular societies, this has only tended to happen during fieldwork periods longer than 6 months; ethnographers spending shorter periods in similar settings generally do not hear of such reports. They describe their own experience in support of this. In essence, such sensitive issues may only be allowed to become apparent to a researcher once sufficient trust and familiarity have been established (although even then they may still be concealed), which evidently takes time. In summary: "… the length of time that a person spends engaged in participant observation does make a very large difference in the kind of findings that may be reported." (Ibid., p.80)

Ultimately, deciding on the number of case studies was seen as a trade-off between a more detailed ethnography and a broader, more varied evidence base for analysis, and finally two cases were chosen instead of just one. Although cross-case comparison was not the research method per se, it is felt that having the opportunity to compare particular aspects of the cases has enhanced the analysis.

Case selection

There are various techniques for selecting cases, depending on the research aims. For example, causal analysis requires cases with a specific outcome to be chosen

(Bennett and Elman, 2006). This research, however, does not focus on any pre-identified effect. Equally, the cases are not intended to be a representative sample of all similar development programmes in sub-Saharan Africa. In order to increase the breadth and richness of findings, I intentionally aimed for diversity between the cases, choosing different countries and contrasts in the programme designs. For example, GVEP International's programme is non-technology and non-product specific, whilst SolarAid focuses only on particular solar photovoltaic products. The initial intention was to have a larger geographical difference between the two cases by selecting one in eastern or southern Africa and one in West Africa. This unfortunately did not prove possible, however, due to difficulties gaining access to the programmes identified in West Africa.

Stake (1994) notes that case studies are often chosen due to particular personal interest rather than purely theoretical reasons and this was certainly one factor here. A desire to investigate solutions in areas lacking rural energy access was a key driver for the research and this is a particularly pertinent issue in sub-Saharan Africa. My professional background is in policies to promote sustainable energy systems and a trip in 2009 to a pico-solar assembly unit in Iringa, Tanzania, sparked my interest in programmes that combine clean energy products with livelihood creation. Not only were local people getting access to solar products, but the assembly unit specifically trained and employed disabled people who otherwise had very limited opportunities for work.

Undoubtedly the other decisive factor in case selection was pragmatism. Language was a major consideration, extremely important for any qualitative research but particularly so for participant observation (Fife, 2005). I therefore restricted the country options to only officially Anglophone or Francophone ones. Even within this there were significant limitations: most African countries have a huge number of local dialects for everyday use, particularly in rural localities, regardless of the official national language. However, the main consideration for me was that I could converse easily and without need of a translator with the staff of the case study organisations.

Another essential practical consideration in sub-Saharan Africa is personal safety (Gokah, 2006) and this reduced the list of possible fieldwork countries further. It is noted that the ethics procedure adhered to for this research considers possible risk to the researcher, as well as to the intended research subjects.

Gaining access

The deduction process described above resulted in a list of possible countries suitable for the fieldwork. The final practical consideration was gaining access. I systematically made contact with and presented my research proposal to organisations identified as having programmes fitting within the described case criteria. Some were unresponsive, while some seemed initially interested but later ceased contact. The most responsive organisations were those contacted via personal links, conveniently illustrating the concept of personal networks as 'social capital'.

Of key importance was 'selling' my research and myself as a useful asset to the organisations during the research period. A benefit of using participant observation was being able to offer myself as a willing participant in the organisations' activities. During the discussions with the organisations, we considered various roles that might be suitable from both a CV perspective and a research needs perspective, i.e. allowing me a full overview of the programme being studied.

Following these discussions, the two case studies were essentially chosen through self-selection. Although this approach may appear to have limited scientific justification, ultimately it is only by taking the practical issues discussed above, such as language, safety and access, fully into account that a thorough and credible piece of case-based research can be produced (Gokah, 2006).

Ethnographic Research Methods

Ethnographic methods originated within anthropology but have since spread to diverse academic fields and now constitute a widely used methodological approach. The classic characteristic of ethnography is 'thick description', a term coined by the anthropologist Geertz (1973) in the introduction to his collection of essays entitled *The Interpretation of Cultures.* Various more descriptive definitions have been used since; O'Reilly (2005) provides a useful overview of these and draws out key elements to create the following description.

> Minimally ethnography is:
>
> - iterative-inductive research (that evolves in design through the study), drawing on:
> - a family of methods,
> - involving direct and sustained contact with human agents
> - within the context of their daily lives (and cultures);

- watching what happens, listening to what is said, asking questions, and
- producing a richly written account
- that respects the irreducibility of human experience,
- that acknowledges the role of theory
- as well as the researcher's own role
- and that views humans as part object/part subject." (ibid., p.3)

The main ethnographic method used was participant observation, supported by, and to some extent contrasted with, semi-structured interviews. I was also able to collect some survey data as part of my 'participant' role with the organisations, and some secondary data already collected by the organisations was made available to me.

Participant observation

The key method within ethnography is observation, either participant or non-participant, determined by the extent of the researcher's involvement in the events that they are observing. The main techniques within participant observation are fairly straightforward, in summary being to:

- observe through participating in activities;
- have informal conversations with people encountered;
- make detailed fieldnotes (thick description) based on those observations and conversations for subsequent analysis, and;
- collect other supporting data.

  (DeWalt and DeWalt, 2002) (Hammersley and Atkinson, 1995)

The renowned anthropologist Bronislaw Malinowski used an increased level of participation compared to other early ethnographers. During his famous study of the Trobriand islanders in Melanesia he learnt the local language within four months and was able to stop using an interpreter. He identified three main benefits of participation: becoming part of the natural setting so that research subjects would become less affected by his presence; having access to everything as a participant rather than having to repeatedly renegotiate access as a researcher, and; increasing understanding through experiencing things as an insider rather than an external observer (O'Reilly, 2005). For ethnography within organisations, the nature and benefits of participatory compared to external observation are even more apparent.

Using ethnographic methods for this type of research seems well justified in the literature. Dorman (2005) discusses the methodological reasoning for ethnographic study of human rights NGOs in Zimbabwe. She argues that the typical reliance on interviews with a large number of different organisations within studies of NGOs in Africa is detrimental and prevents adequate research into how NGOs actually function and the context of their emergence. Dorman (ibid., p.38) concludes that: "… we need to study NGOs from inside, using techniques such as participant-observation that enable us to create detailed, descriptive case studies." Similarly Suzuki (1997) notes that: "So far, little of the literature has discussed the internal dynamics of NGOs as organizations: most tends to treat NGOs as single, coherent entities. In reality, however, an NGO is a complex entity that consists of diverse offices staffed by diverse members who hold diverse values" (p.2).

Gomm (2008) suggests that research methods such as surveys and interviews provide a distorted picture of reality because of being set up by researchers to generate data. Ethnographic methods, by comparison, focus on 'naturally occurring' situations which have been less impacted by a researcher's actions. This can be described as 'naturalistic validity', analogous to studying animals in their natural habitats. However, reflexivity about the researcher's impacts on data collected and its analysis is still vital when applying ethnographic methods.

Appendix B: List of interviews

No.	Company name	Year	Date	Interviewee role	Interview location	Company activity	Company type[34]	Company HQ
1	Daima Energy	2011	10 Oct	2 x Directors	Nairobi, Kenya	SHS[35] and pico-solar distribution	Business	UK
2	Africa Bio Products	2011	13 Oct	Manager	Nairobi, Kenya	Briquette manufacturing	Business	Kenya
3	Rural Energy Foundation	2011	28 Oct	Previous employee	Naivasha, Kenya	Pico-solar distribution	NGO (now social enterprise)	Netherlands
4	Women's Enterprise Development Initiative (WEDI)	2011	3 Nov	Director	Nyeri, Kenya	Pico-solar distribution	SACCO	Kenya
5	Envirofit	2011	11 Nov	Director	Nairobi, Kenya	Cookstove manufacturing	Social enterprise	US
6	East Africa Energy	2011	11 Nov	Director	Nairobi, Kenya	Coosktove distribution	Social enterprise	UK
7	South Pole / Perspectives	2011	11 Nov	Project manager	Nairobi, Kenya	Carbon finance	Business	Switzerland
8	Rongo Briquettes	2011	17 Nov	Director	Rongo, Kenya	Briquette manufacturing	Business	Kenya
9	GIZ	2011	24 Nov	2 x Managers	Nairobi, Kenya	International development	Development agency	Germany
10	Viability Africa	2011	13 Dec	Project manager	Kampala, Uganda	Carbon finance	Business	Kenya
11	Ugastove	2011	19 Dec	Marketing manger	Kampala, Uganda	Cookstove manufacturing	Business	Uganda

[34] As declared by interviewee
[35] SHS = Solar home systems, defined as >10W (GIZ, 2010)

No.	Company name	Year	Date	Interviewee role	Interview location	Company activity	Company type[34]	Company HQ
12	Up Energy	2012	12 Jan Follow-up: 18 Jan	Manager	Kampala, Uganda	Cookstove distribution	Social enterprise	US
13	Impact Carbon	2012	13 Jan	Business development manager	Kampala, Uganda	Carbon finance	NGO	US
14	Barefoot	2012	17 Jan	Manger	Kampala, Uganda	Pico-solar manufacturing	Social enterprise	Australia
15	Uganda Carbon Bureau (UCB)	2012	17 Jan	Director; Project manager	Kampala, Uganda	Carbon finance	Business (with charitable sub-entities)	Uganda
16	Green BioEnergy	2012	18 Jan	Director	Kampala, Uganda	Briquette manufacturing	Social enterprise	Uganda
17	ToughStuff	2012	18 Jan	Manager	Kampala, Uganda	Carbon finance	Social enterprise	UK
18	Living Goods	2012	19 Jan	Manager	Kampala, Uganda	Health and energy products distribution	Social enterprise (registered in Uganda as NGO	US
19	Solar Sister	2012	19 Jan	Manager	Kampala, Uganda	Pico-solar distribution	Social enterprise	US
20	Carbon Africa	2012	20 Jan	Project manager	Kampala, Uganda	Carbon finance	Business	Uganda
21	Village Energy	2012	20 Jan	Director	Kampala, Uganda	Pico-solar assembly	Social enterprise	Uganda
22	Rise Solar	2012	20 Jan	Director	Kampala, Uganda	Pico-solar assembly	Social enterprise	US

No.	Company name	Year	Date	Interviewee role	Interview location	Company activity	Company type[34]	Company HQ
23	CO_2 Balance	2012	9 Feb	Director	Nairobi but interviewee in UK (via Skype)	Carbon finance	Business	UK
24	Kenital Solar	2012	10 Feb	Director	Nairobi, Kenya	SHS distribution	Business	Kenya
25	Climate Care	2012	13 Feb	Director	Nairobi, Kenya	Carbon finance	Business	UK
26	Sollatek East Africa	2012	16 Feb	Manager	Mombasa, Kenya	SHS distribution	Business	Kenya (UK for global company)
27	Kenya Women Finance Trust (KWFT)	2012	17 Feb	Branch manager	Kinango, Kenya	Microfinance, including pico-solar distribution	Social enterprise (with parent NGO)	Kenya
28	Practical Action	2012	22 Feb	Project manager	Nairobi, Kenya	International development	NGO (with sister business)	UK
29	d.light design	2012	22 Feb	Country manager	Nairobi, Kenya	Pico-solar manufacturing	Social enterprise	US
30	Energy Regulatory Commission	2012	22 Feb	Director	Nairobi, Kenya	Government agency	Government	Kenya
31	Toyota Malawi	2012	12 April	Sales manager	Mzuzu, Malawi	SunnyMoney corporate customer	Business	Malawi (/international)
32	Landirani Trust	2012	29 April	Project manager	Lilongwe, Malawi	International development including pico-solar distribution	NGO	UK
33	Foundation to help Malawi	2012	3 May	2 x Directors	Mzuzu, Malawi	International development including pico-solar distribution	NGO	Denmark

No.	Company name	Year	Date	Interviewee role	Interview location	Company activity	Company type[34]	Company HQ
34	Illovo Sugar	2012	23 May	Manager	Dwangwa, Malawi	SunnyMoney corporate customer	Business	Malawi
35	Global Solar	2012	31 May	Sales manager	Blantyre, Malawi	Pico-solar and SHS distribution	Business	Malawi
36	Jacaranda school for orphans	2012	31 May	International volunteer	Blantyre, Malawi	Pico-solar assembly	NGO	Malawi
37	RenewNAble Malawi	2012	1 Jun	Manager	Blantyre, Malawi	Pico-solar distribution	NGO	Malawi
38	Malawi Bureau of Standards	2012	2 Jun	Advisor	Blantyre, Malawi	Government agency	Government	Malawi
39	Malawi Procurement Authority	2012	5 Jun	Assistant manager	Mzuzu, Malawi	Government agency	Government	Malawi
40	Citrefine	2012	17 July	2 x Directors	Viphya plateau, Malawi	SunnyMoney corporate customer	Business	Malawi

Appendix C: Methodological tools

Initial questions for DEEP entrepreneurs

Basic information

- Entrepreneur Name
- Company Name
- Individual or group?
- Anonymity?
- Mentor Name
- Date
- Time / location:

Core questions

What are your main business activities?

How did you first find out about the technology?

How did you come to be a DEEP entrepreneur?

What changes have you experienced due to your involvement with DEEP?

(And if only positive answers provided to previous question) Have you experienced any drawbacks of being involved with DEEP?

How would you like to develop your business in future?

What difficulties do you still encounter with your business, or might stop you from developing it as envisaged?

Who are your main customers? (e.g. wholesalers / individuals)

How do you find new customers?

Are the products you make/sell certified under an official standards framework?

Are the products /services provided with a warranty?

How do you determine the price of your products/services?

How do customers pay you for the products/services? (e.g. in advance/ at purchase/on credit basis)

Initial questions for non-case study organisations

Basic information

- Name
- Job Title
- Organisation
- Date
- Time / location
- Confidentiality

Core questions

What is the aim of your organisation?

How do you describe your organisation? (e.g. NGO/not-for-profit/social enterprise etc.)

What led to the organisation being formed?

Where is it headquartered and where are the regional offices?

How long have you/your organisation been working in this sector and region? Why this sector/region in particular?

What number of staff? Local/expat?

Who are you main donors/shareholders? What influence do they have on strategy/operations?

What is your organisation's current approach? How has your approach changed over time and why?

How do you see the approach developing in the future and why? Main challenges to overcome?

Do you work with other organisations in the same field? What do you gain from these relationships? Do you get any support from the government? (e.g. tax exemptions?)

Do you have competitors and how do their approaches differ?

Questions specific to product manufacturers/distributors

How did you decide which products to sell? How do you guarantee quality? Do you offer a warranty?

How do you decide the pricing of your products? Do you offer a time payment service to end-users/dealers?

Questions specific to carbon finance organisations

What is the carbon project design, particularly in terms of carbon revenue?

How significant do you feel the existence of carbon finance mechanisms is for the growth of clean energy product markets in the country/region?

How could carbon finance frameworks better support the dissemination of clean energy products to domestic end-users?

Appendix D: Case study artefacts

Developing Energy Enterprises Project (DEEP) Log Frame

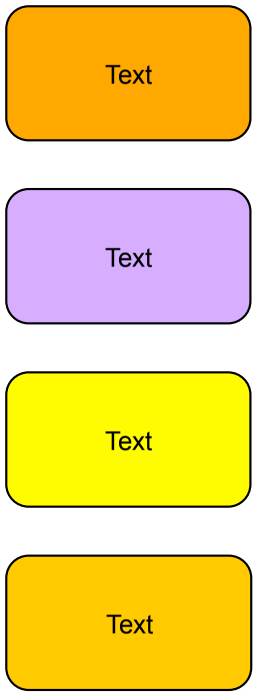
	Intervention Logic	Objectively verifiable indicators of achievement	Sources and means of vrification	Assumptions
Overall	*What are the overall broader Objectives to which the action will contribute*	*What are the key indicators related to the overall objectives*	*What are the sources of information for these indicators*	
	To increase the availability of sustainable, affordable and appropriate energy services to those unserved or underserved in rural and peri-urban areas of Kenya, Tanzania and Uganda.	1,800,000 rural and peri-urban men and women have been able to access energy services from enterprises supported by the project during the project duration.	Data provided on business performance and service delivery provided by supported enterprises cross checked by community surveys	Since DEEP East Africa works upstream of the ultimate beneficiaries by helping start up and develop the micro and small energy enterprises which will provide the services, the key assumption is that this type of approach does indeed lead to increased access to energy for rural and peri-urban poor. Experience from S3IDF, Shell Foundation, E+Co and AREED in particular reinforce the validity of this assumption.
	To increase the availability of employment opportunities in rural and peri-urban areas.	1300 rural men and women employed in rural and peri-urban energy enterprises supported by the action at the end of the action duration.	Reporting by GVEP International, project partners and supported enterprises via project M&E systems.	As the project does not directly employ energy service providers it is not possible to guarantee employment rates and some more efficient firms may actually employ less people, some firms will grow to be very large employers while others will remain at small scale. The estimate left however uses a conservative average of three employees per firm across all surviving firms taken from S3IDF experience.
		1300 rural men and women are employed in rural and peri-urban enterprises enabled by the provision of the energy services by enterprises supported by DEEP EA at the end of the action duration.	Reporting by GVEP International, project partners and supported enterprises via project M&E systems.	As the project does not directly employ persons in firms using energy services it is not possible to guarantee employment rates since the range of services provided by supported energy firms will mean that some will enable many knock on employment opportunities (eg mini-grid electricity providers) whereas others such as improved stove makers may not. The estimate left however uses an average of three employees per firm across all surviving firms taken from S3IDF experience.
Specific Objective	*What specific objective is the action intended to achieve to contribute to the overall objectives*	*Which indicators clearly show that the objective of the action has been achieved*	*What are the sources of information that exist or can be collected? What is required to get this information?*	*Which factors and conditions outside the Beneficiary's responsibility are necessary to achive that objective?(external conditions) Which risks should be taken into consideration?*
	To enable the development of a sustainable and widespread industry of micro and small energy enterprises providing rural and peri-urban energy services and employment in Kenya, Tanzania and Uganda.	1800 micro and small enterprises (MSEs) started-up, diversifying into providing energy services or improving existing energy services in rural and peri-urban areas with the assistance of the project.	Reporting by GVEP International, project partners and supported enterprises via project M&E systems. Business registration departments of local governments will also be able to verify this as all supported firms will be registered to an address.	DEEP East Africa provides only the opportunity, support and incentives to people to start businesses in the energy sector. Although market surveys and the business and energy climate indicate that this will be taken up the proportion of new starts to existing diversifying businesses to scaled up existing firms is difficult to ascertain exactly prior to project commencement.
		720 firms with business ideas supported by the action (start ups and existing MSEs) receive financing for the business plans they present	Reporting by GVEP International, project partners and supported enterprises via project M&E systems. The records of financing bodies will also provide this information and can usually be requested from that body.	Financing is available to the businesses developed from such sources as GVEP, private sector, donor, government, NGO, CSR and other sources
		430 supported firms survive past the second year providing energy services.	Reporting by GVEP International, project partners and supported enterprises via project M&E systems. Checking of businesses at their registered addresses could also be undertaken to verify presence and operation.	DEEP East Africa addresses the main reasons for business failure i.e. poor management, lack of technical capacity and lack of financing. However there are still many other external reasons why a business may fail from personal issues of owners to environmental factors and markets.
Expected results	*The results are the outputs envisaged to achieve the specific objective. What are the expected results? (enumerate them)*	*What are the indicators to measure whether and to what extent the action achieves the expected results?*	*What are the sources of information for these indicators?*	*What external conditions must be met to obtain the expected results on schedule?*
	Increased awareness of business and service opportunities through energy in the rural and peri-urban market. (Work Packages 1 +2)	90 co-ordination meetings held with relevant stakeholders and other initiatives to increase collaborations and number of communications channels within the first 3 months of the project.	Progress reports will be prepared by project management staff.	Weather, political and travel conditions do not adversely affect arrangement of co-ordination meetings.
		Tools for marketing and awareness raising developed and co-ordinated within the first 3 months of the project.	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate. Completed tools will be reviewed after 3rd month.	Weather, political and travel conditions do not adversely affect arrangement of co-ordination meetings. Electricity and other services such as e-mail and telephone to partner offices are not interrupted during the process.
		An average of 10 key stakeholders and other initiatives at each of 15 kick off seminars during first 3 months of the project	Progress reports will be prepared by project management staff.	Weather, political and travel conditions do not adversely affect arrangement of kick-off seminars. Meetings will be arranged around existing cultural events or holidays to avoid clashes and maximise attendance. Where appropriate workshops may be held as part of other relevant conferences or events.
		30 MoUs signed with NGOs or other initiatives to assist in making their stakeholders aware of opportunity and involvement in marketing or to collaborate with the action in someother way.	Progress reports will be prepared by project management staff including lists of co-operating organisations.	Legal or other concerns on the part of potential collaborating NGOs do not inhibit them from signing MoUs
		An average of 20 attendees (at 50:50 proportion of men and women) at a total of 600 awareness raising and marketing workshops and seminars held over the first 2+1/4 years of the action (12,000 people).	Short summary reports will be prepared by each consortium partner for each event within project progress reports and verified by project management staff as appropriate.	There is sufficient interest in energy services mobilisable within the communities to enable such attendance. Weather, political and travel conditions do not adversely affect arrangement of co-ordination meetings. Meetings will be arranged around existing cultural events or holidays to avoid clashes and maximise attendance. Where appropriate workshops may be held as part of other well attended community events.
		2400 attendees (at 50:50 proportion of men and women) at follow up idea generation and business start up meetings over the first 2+3/4 years of the action	Short summary reports will be prepared by each consortium partner for each event within project progress reports and verified by project management staff as appropriate.	There is sufficient interest in starting or developing business ventures mobilisable within the communities to enable such attendance. Weather, political and travel conditions do not adversely affect arrangement of co-ordination meetings. Meetings will be arranged around existing cultural events or holidays to avoid clashes and maximise attendance.
		2000 initial ideas (50:50 proportions of men and women) having initial sustainable development due diligence carried out on them over the first 3+1/2 years of the action	Progress reports will be provided by consortium partners listing applications and verified by project management staff as appropriate.	There is sufficient interest in starting or developing business ventures mobilisable within the communities to enable such a number of applications and so initial due diligence appraisals.
		1800 initial ideas (50:50 proportions of men and women) passing initial sustainable development due diligence (either at first pass or after feedback) and being approved for BDS/Technical support within the first 3+1/2 years of the action	Progress reports will be provided by consortium partners highlighting the number of individuals and existing MSEs being approved for full support under DEEP EA.	The level of education and ability of the individuals and MSEs completing the initial business ideas is such that it is possible with support to assist them in developing ideas which are suitable in principle.
	Increased business management capacity in East Africa especially in rural and peri-urban areas (Work Packages 1+3)	BDS tools and training procedures for rural and peri-urban entrepreneurs developed and co-ordinated within the first 3 months of the project.	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate. Tools should be presented and shared with partners after the 3rd month of the project.	Weather, political and travel conditions do not adversely affect arrangement of co-ordination meetings. Electricity and other services such as e-mail and telephone to partner offices are not interrupted during the process.
		300 business mentors trained and qualified (including proportions of men vs women) over the first 6 months of the project.	Progress reports will be prepared by EMEA and verified by project management staff as appropriate.	There are sufficient persons in rural and peri urban areas suitable and interested in taking up the training and work as a business mentor including enough women.
		1,800 Entrepreneurs receiving business mentoring and training (including proportion receiving start-up, survival and growth training or more than one of these) over the duration of the project	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	Weather, political and travel conditions do not adversely affect arrangement of trainings and mentoring meetings. For assumptions about numbers of entrepreneurs participating see Work Package 2 which feeds participants into this task.
		10 mentoring sessions received on average per entrepreneur over the duration of the project	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	Weather, political and travel conditions do not adversely affect arrangement of trainings and mentoring meetings.

		1800 entrepreneurs attending classroom networking and peer group lesson learning sessions over the duration of the action.	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	Weather, political and travel conditions do not adversely affect arrangement of sessions. Meetings will be arranged around existing cultural events or holidays to avoid clashes and maximise attendance. For assumptions about numbers of entrepreneurs participating see Work Package 2 which feeds participants into this task.
		Each entrepreneur attending an average of 2 of the 600 networking and peer group shared lesson learning sessions held over the duration of the action.	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	Weather, political and travel conditions do not adversely affect arrangement of classroom networking and peer group sharing sessions.
	Increased energy technical capacity in East Africa especially in rural and peri-urban areas (Work Packages 1+3)	Energy Technology training and support tools for rural entrepreneurs developed and co-ordinated	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate. Tools should be presented and shared with partners after the 3rd month of the project.	Weather, political and travel conditions do not adversely affect arrangement of co-ordination meetings. Electricity and other services such as e-mail and telephone to partner offices are not interrupted during the process.
		1800 entrepreneurs receiving energy technical training and consultancy during the duration of the action	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	Weather, political and travel conditions do not adversely affect arrangement of trainings and mentoring meetings. For assumptions about numbers of entrepreneurs participating see Work Package 2 which feeds participants into this task.
		1 x 5 day training session attended by each entrepreneur over the duration of the action	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	Weather, political and travel conditions do not adversely affect arrangement of training.
		1 energy technical consultancy 1-to-1 meeting received per entrepreneur over the duration of the project.	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	Weather, political and travel conditions do not adversely affect arrangement of 1-to-1 consultancy meetings.
	Increased access of rural and peri-urban energy enterprises to finance (Work Packages 4)	1620 business plans prepared for finance application over the first 3 1/2 years of the action	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	The level of education and ability of the individuals and MSEs completing the business plans is such that it is possible with support to assist them in developing plans which are suitable in principle.
		1944 energy and technical due diligence appraisals carried out on business plans during the first 3+3/4 years of the project (assuming a 20% rejection and resubmission rate)	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	The level of enthusiasm amongst applicants is sufficient for a proportion of those which are rejected first time to improve and resubmit their plans.
		1440 business plans passing due diligence (either first time or on revision after feedback) and being forwarded on for finance application (50:50 proportions of men and women) over the first 4 years of the action.	Progress reports will be provided by consortium partners highlighting the number of individuals and existing MSEs going forward for financing which will be tracked against targets.	The competence of the individuals and MSEs completing the business plans is such that it is possible with support to assist them in developing plans which are successful at the acceptance, rejection and resubmission rates expected.
		720 entrepreneurs receiving financing over the duration of the project (50:50 proportions of men and women).	Updates on the responses of funding bodies to proposals will be compiled by GVEP International.	Financing is available to the businesses developed from such sources as GVEP, private sector, donor, government, NGO, CSR and other sources
		7M Euros leveraged in funding for DEEP East Arica supported businesses over the duration of the action	Value and number of financing approved for supported firms will be tracked by GVEP International along with responses.	Financing is available to the businesses developed from such sources as GVEP, private sector, donor, government, NGO, CSR and other sources
Activities	*What are the key activities to be carried out and in what sequence in order to produce the expeted results? (group the activities by result)*	***Means:** What are the means required to implement these activities, e.g. personnel, equipment, training, studies, supplies, operational facilities etc.*	*What are the sources of information about action progress?* ***Costs*** *What are the action costs? How are they classified? (breakdown in the Budget for the Action)* (See Left margin for approximate Work Package Costs)	*What pre-conditions are required before the action starts? What conditions outside the Beneficiary's direct control have to be met for the implementation of the planned activities?*
Work Package 1 - Inception Approx WP1 Cost =Euros 360K	1.1) Make contact with other project initiatives and mobilise local resources	One-to-one meetings, telephone calls, e-mailing, newsletters. Carried out by project management staff primarily in first 3 months of project.	Progress reports will be prepared by project management staff.	Awareness and cordial relationships already exist between key project partners and other initiatives and local resources with which contact is to be made. (This pre-condition is already met)
	1.2) Conduct initial kick-off seminars with local stakeholders and other initiatives	Seminars, workshops and conferences. Rooms, venues, tranpsortation, refreshments, presentation materials and equipment will be provided. Carried out by project management staff primarily during first 3 months of project.	Progress reports will be prepared by project management staff.	Other local stakeholders and initiatives must have time to attend kick-off seminars. Weather, political and travel conditions do not adversely affect arrangement of kick-off seminars.
	1.3) Conduct initial co-ordination meetings between partners to co-ordinate and adapt project tools and approaches	Team meetings and workshops, electronic and paper exchange of drafts and updates. Involving both Management and implementation staff during first 3 months of project.	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate. Tools should be presented and shared with partners after the 3rd month of the project.	Partners must already have experience and tools available to build from and co-ordinate with. (This pre-condition is already met) Electricity and other services such as e-mail and telephone to partner offices are not interrupted during the process.
	1.4) Develop detailled implementation strategy and roll out plan	Meetings between relevant partner team members at management and implementation levels during first three months of project.	The plan will be presented to all partners and key stakeholders at the conclusion of the inception work package after the 3rd month of the project.	Weather, political and travel conditions do not adversely affect arrangement of co-ordination meetings. Electricity and other services such as e-mail and telephone to partner offices are not interrupted during the process.
Work Package 2 - Community Mobilisation and Marketing Approx WP2 Cost =Euros 750K	2.1) Marketing of DEEP EA opportunity to existing small business community	Advertising through business media, chambers of commerce, small business networks such as Jua Kali in Kenya, local journals and word of mouth. Arrangement of seminars and workshops over first 3 years of the action.	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	Awareness of most relevant communications channels and access to staff with capacity to develop appropriate materials. (This pre-condition is already met). Additionally political and travel restrictions must not inhibit the dissemination of information or seminar arrangement. Collaboration of groups, industry associations, networks etc is also required. (See Activities 1.1 and 1.2)
	2.2) Awareness raising and information dissemination on DEEP EA to local communities	Advertising through local popular media and information channels including through church groups, womens groups, radio etc. Workshops and seminars staged in rural and peri-urban areas across countries of action in first 3 years.	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	Awareness of most relevant communications channels and access to staff with capacity to develop appropriate materials. (This pre-condition is already met). Additionally political and travel restrictions must not inhibit the dissemination of information or seminar arrangement. Collaboration of church and womens groups, NGOs, co-ops, networks etc is also required (See Activities 1.1 and 1.2)
	2.3) Initial idea start-up support workshops and one-to-one meetings	Advertised at the awareness raising sessions under Activity 2.2. Held within subsequently in a local venue using brainstorming, market targeting and question and answer techniques.	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	There is sufficient interest in starting or developing business ventures mobilisable within the communities to enable such attendance. Weather, political and travel conditions do not adversely affect arrangement of co-ordination meetings. Meetings will be arranged around existing cultural events or holidays to avoid clashes and maximise attendance. Allowance must made for child care if necessary for female participation.
	2.4) Conducting of initial sustainable development due diligence on initial enterprise ideas	Conducted by local community mobilisation and marketing staff of partner NGOs using standardised criteria and form to ensure alignment of initial proposals to project aims and that projects meet sustainability criteria.	Progress reports will be provided by consortium partners highlighting the number of individuals and existing MSEs being approved for full support under DEEP EA which will be tracked against targets	There is sufficient interest in starting or developing business ventures mobilisable within the communities to enable such a number of applications and so initial due diligence appraisals.
Work Package 3 - Business and Technical Assistance Approx WP3 Cost =Euros 1700K	3.1) Recruitment and induction of business support "mentors"	Adverstisement of mentoring opportunity in business media and through existing mentoring channels used by EME-Africa. Training carried out using existing training materials. Qualification carried out through testing.	Progress reports will be prepared by EMEA and verified by project management staff as appropriate.	There are sufficient persons in rural and peri urban areas suitable and interested in taking up the training and work as a business mentor including enough women.
	3.2) Provision of business support advice and training in one-to-one meetings with mentors	Training programmes delivered in business start-up, survival and growth phases. Business mentoring used as the main support vehicle through 1-to-1 sessions with entrepreneurs.	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	There are sufficient business mentors and trainers available (see task 3.1 above), appropriate tools available for training (see Activity 1.3) and sufficient entrepreneurs to be mentored (see Work Package 2 above).
	3.3) Provision of energy technical support and training in one-to-one consultancy sessions	Training programmes delivered on energy technology issues and opportunities. Individual consultancy sessions with entrepreneurs to discuss develop and advise them on technology use.	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	There are appropriate tools available for training (see Activity 1.3) and sufficient entrepreneurs to be trained (see Work Package 2 above).

	3.4) Facilitation of group networking and information sharing sessions for DEEP EA supported entrepreneurs and peers	Forums created for discussion between supported entrepreneurs and sharing of experiences and resources. Facilitation techniques employed by facilitators from DEEP East Africa.	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	Weather, political and travel conditions do not adversely affect arrangement of sessions. Meetings will be arranged around existing cultural events or holidays to avoid clashes and maximise attendance. For assumptions about numbers of entrepreneurs participating see Work Package 2 which feeds participants into this activity.
Work Package 4 - Due Diligence and Financial Application Approx WP4 Cost =Euros 490K	4.1) Assistance in development of business plan and funding proposals	The Business planning approach and a template will be provided and explained to applicants in appropriate languages. Initial drafts from entrepreneurs will be considered and feedback provided on them by mentors.	Progress reports will be prepared by each consortium partner and verified by project management staff as appropriate.	There are sufficient persons in rural and peri urban areas suitable and interested in taking up the training and work as a business mentor (including enough women) since these will be the staff assisting in business plan preparation (see Activity 3.1)
	4.2) Conducting of due diligence into business plans going forward for funding	Technical and Business due diligence will be carried out using a standardised approach and results presented using a standard format.	Progress reports will be provided by consortium partners highlighting the number of individuals and existing MSEs going forward for financing which will be tracked against targets.	There are sufficient persons in rural and peri urban areas suitable and interested in taking up the training and work as a business mentor (including enough women) since these will be the staff assisting in due diligence, with project management staff oversight (see Activity 3.1).
	4.3) Support to businesses in presenting proposals to funding bodies	All relevant funding opportunities will have been surveyed and contacted to ensure relevance and compliance with application procedures. Applications sent through agreed channels.	Updates on the responses of funding bodies to proposals will be compiled by GVEP.	The competence of the individuals and MSEs completing the business plans is such that it is possible with support to assist them in developing plans which are suitable in principle for submission to funding bodies. Additionally that their motivation is sufficient for them to revise and resubmit applications in cases where they are rejected by due diligence the first time.
Work Package 5 - Monitoring and Evaluation and Scale Up Approx WP5 Cost =Euros 390K	5.1) Documentation of baseline situation in target areas	Physical surveys, social surveys, use of existing data from regional and national government data sources. Database tools used to compile data.	Progress reports will be prepared by the M&E partner prior to delivery of the baseline report after the 6th month of the project.	Weather, political and travel conditions do not adversely affect the ability of survey staff to conduct their work. That data held by local and national governments on populations, infrastructure etc is made available to the team.
	5.2) Capacity Building around M&E with business mentors	Training materials delivered during mentor training explaining need, approaches and standardised forms and reporting mechanisms.	Progress reports will be prepared by the M&E Partner on the progress of training during the first 6 months.	Training materials are available for training (see Activity 1.3).
	5.3) Development of indicators for project and for the businesses assisted	Starting with the framework provided by this logframe, develop further detailed indicators along with project partners during the first 6 months of the project.	Progress reports will be prepared by the M&E partner prior to delivery of the indicators framework after the 3rd month of the project.	Partners must already have experience in the sector in order to define appropriate SMART indicators. (This pre-condition is already met)
	5.4) Conducting of ongoing and follow-up M&E of project and businesses supported	Tracking, collecting, chasing, checking and compiling M&E data coming in from project staff, business mentors and managers. Database software used to store and arrange data to facilitate analysis.	Progress reports will be prepared by the M&E partner and verified by project management staff as appropriate.	Appropriate and usable reporting processes must be in place and capacity must be available within the project staff and supported businesses in order to facilitate the collection of data (see Activities 5.2 and 5.3)

SolarAid / SunnyMoney Theory of Change

Key to Theory of Change



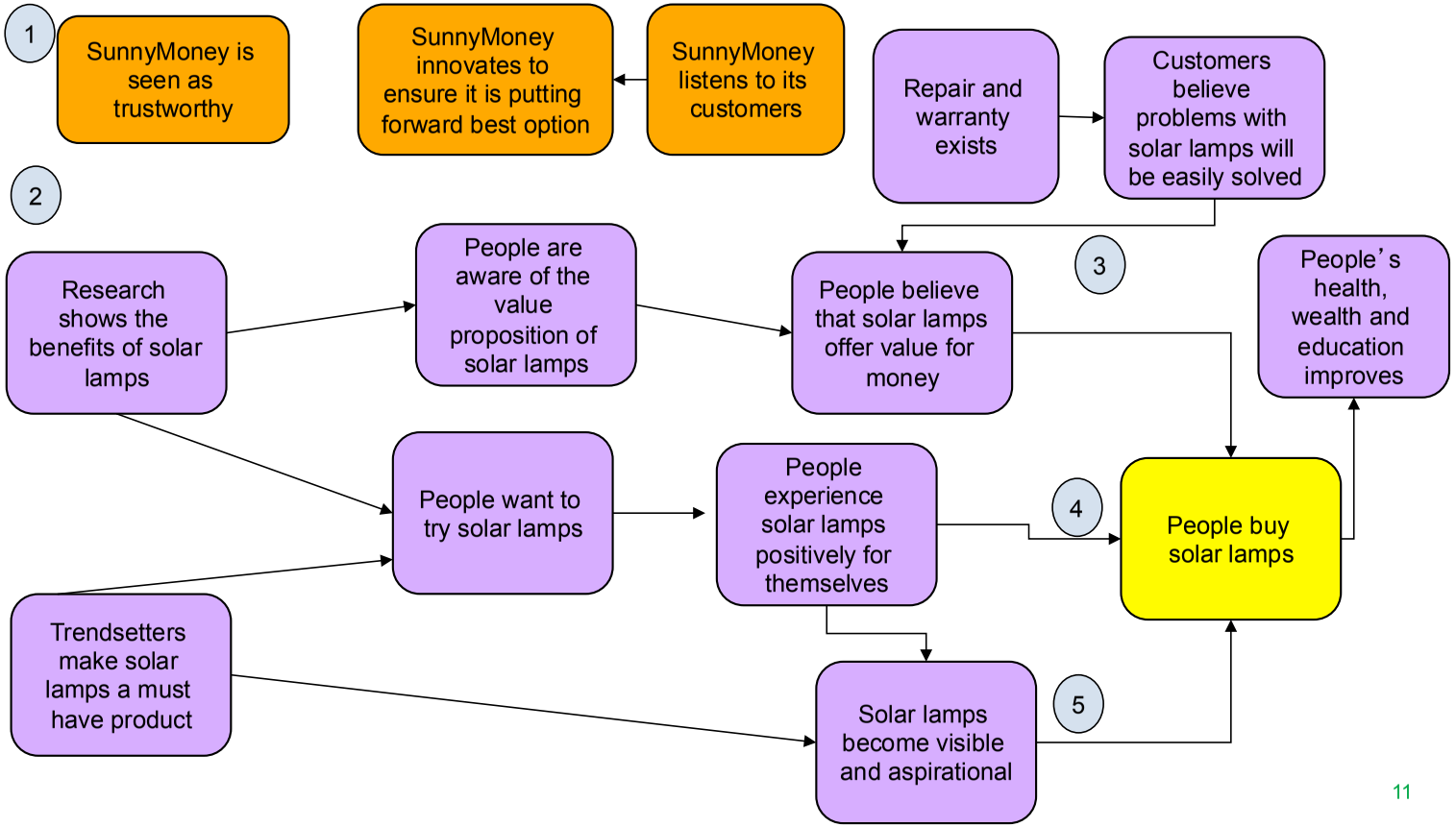
Enabling factors—without which the whole theory of change is undermined

Intermediate outcomes—the necessary things which have to happen for Solar Aid's theory of change

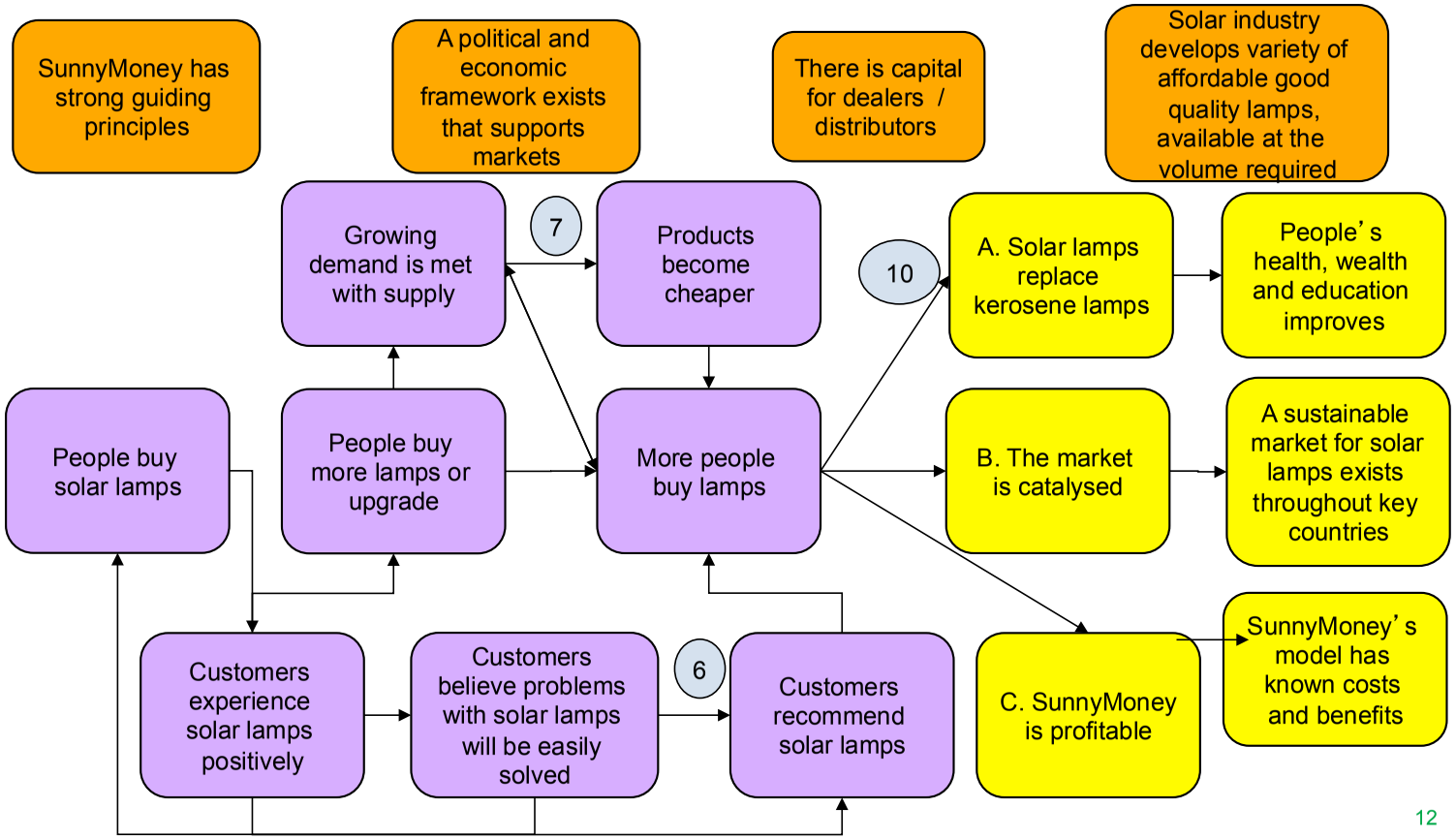
Key outcomes—for Solar Aid to achieve its goal and go to the next stage

Solar Aid's BHAG

Phase 1: building demand for solar lamps



Phase 2: Catalysing the markets in key countries



Phase 3: sharing the model of catalysing a market to replace kerosene